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Marshfield Groundwater Protection Study

Metropolitan Area
Planning Council
110 Tremont Street
Boston, MA 02108

MARSHFIELD

GROUNDWATER PROTECTION

STUDY

SEPTEMBER 1987

METROPOLITAN AREA PLANNING COUNCIL
BOSTON, MASSACHUSETTS

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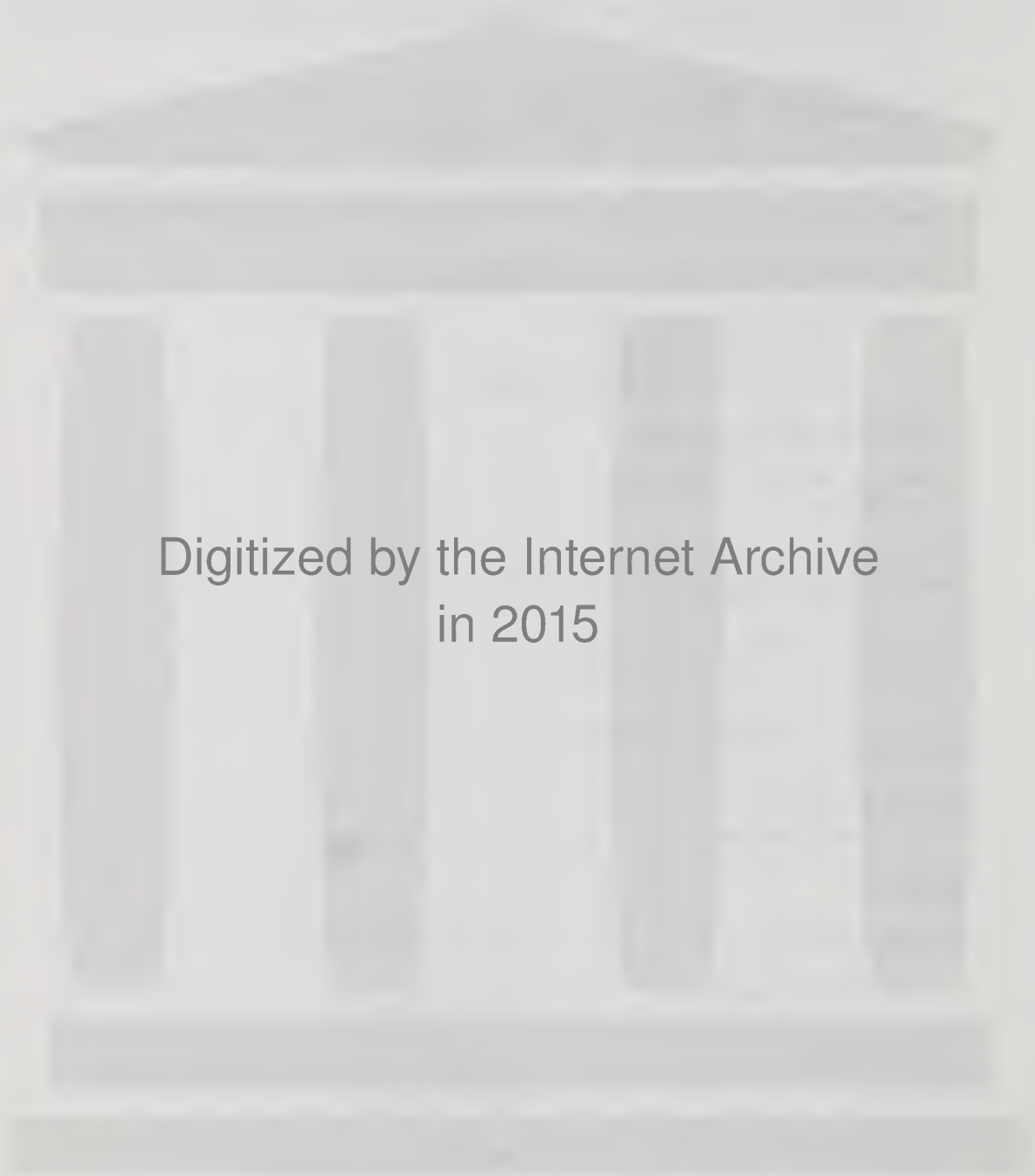

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MARSHFIELD GROUNDWATER PROTECTION STUDY

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Chapter 1

BACKGROUND AND SUMMARY

This technical assistance report was prepared at the request of the town of Marshfield, whose officials have expressed an interest in protecting the town's water supply sources. Marshfield meets all of its water supply needs with local sources of groundwater. The need to protect the aquifers which supply the town's drinking water has been underscored by the recent contamination of several municipal wells by organic chemicals. The loss of these wells has placed a great burden on the remaining wells; the loss of any additional wells would severely hinder the ability of the system to meet the town's water needs.

Marshfield is a developing suburban community of about 20,000. Although the town grew rapidly from 1950 to 1975, in the last decade growth has slowed considerably, and the population is projected to stabilize at about 24,000 by the turn of the century.

Marshfield operates 12 wells which are located in sand and gravel aquifers generally in the central and western portions of the town. The aquifers underlie about 6500 acres, or 35 percent of the town. About half of the aquifer areas are developed, largely with residential land uses. This aquifer area is the major focus of this study, since any polluting activities in this area could affect the town's water supply sources.

The overall methodology of this study included the following steps:

- inventory the water resources of the town and identify areas of particular significance to the quality and quantity of the water supply;
- inventory existing land uses and identify potential sources of contamination in the study area, and assess their potential threat to the quality of the water supply sources;
- evaluate the zoning of the undeveloped land within the study area and determine the extent to which new permitted land uses could affect the water supply in the future;
- review all existing federal, state, and local laws and regulations which control land uses and known sources of contamination; and
- recommend additional local water supply protection measures to mitigate existing and potential land use and zoning conflicts identified.

All of the findings and recommendations of this study were reviewed by a Groundwater Study committee appointed by the Selectmen and comprised of representatives of the Board of Selectmen, Planning Board, Board of Health, Water Department, Conservation Commission, and interested citizens. The Committee also consulted with the Fire Department, the Board of Appeals, and the town planner. The Committee met throughout the course of the study and provided invaluable information and guidance.

Protection of the water supply sources is vitally important in Marshfield because all drinking water comes from local sources and there are few if any practical alternative supply sources available to the town.

Other towns in the region face supply shortages, and the Massachusetts Water Resources Authority cannot be considered an alternative. Marshfield's ability to remain self-sufficient in water supply, and to grow economically, will depend on how well the town's groundwater resources are managed and protected over the long term. Marshfield has a number of policies which currently contribute to the protection of the town's water supplies. For example:

- the town owns several key parcels of conservation land in the vicinity of some of the wells;
- the zoning bylaw includes a wetlands protection district;
- the town has designated several areas where road salt is not applied to reduce the levels of sodium in the groundwater;
- the Board of Health has adopted regulations which include septic system requirements more stringent than Title 5.

This study has examined land uses, zoning, and regulations in the town and has identified areas requiring additional protection to insure the long term protection of the groundwater resources. This has led to a set of recommendations for augmenting the town's policies and regulations for protecting the water supply. The major elements of this program are:

- a recommendation to conduct additional hydrogeologic studies to identify areas of contribution to wells;
- a zoning amendment to create an Aquifer Protection District;
- a general bylaw to regulate hazardous materials handled by businesses and industries;
- an amendment to the earth removal regulations to require that the depth of excavation extend no deeper than ten feet above the water table, as determined by field evaluation;
- amendments to the subdivision regulations to allow the Planning Board to require data and mitigation measures for groundwater protection;
- an underground fuel bylaw which requires registration of all underground fuel tanks, and prohibits new residential underground fuel tanks;
- collection of household hazardous wastes and public education about proper handling and disposal of hazardous materials.

Implementation and administration of the recommended program will require the cooperation and support of several town boards, as well as Town Meeting support for new or amended bylaws. An important element for successful implementation will be public education. The Groundwater Study Committee has a useful role to play in promoting these efforts, which may include public meetings and presentations. Increasing public awareness of the need for groundwater protection may be as important as modifying local regulations in meeting the goals of the groundwater protection program.

In the chapters that follow, the background, analysis, and the recommended groundwater protection program are described in detail. It is hoped that this study will focus attention on groundwater protection and assist the town of Marshfield in the development of a comprehensive water supply protection program.

Chapter 2

WATER SUPPLY SYSTEM PROFILE

Prior to examining the protection needs of Marshfield's groundwater resources, it is useful to have an overview of the elements and operation of the water supply system. This will aid in formulating a protection plan which is responsive to the needs of the town.

WATER USE AND CONSUMPTION

The Marshfield Water Department supplies water to about 23,000 people in Marshfield, or about 99% of the population. There are 8,567 service connections. In 1986 the system delivered a total of 1,111,272,000 gallons.

Over the last five years, average day demand has fluctuated between 2.7 and 3.3 mgd. Maximum day demand reached a peak of about 6 mgd during the same period (see Table 2-1 and Figure 2-1).

TABLE 2-1
HISTORIC WATER USE

YEAR	AVERAGE DAY (mgd)	MAXIMUM DAY (mgd)
1982	2.76	6.08
1983	2.73	4.97
1984	3.19	6.00
1985	3.31	6.08
1986	3.04	5.56

WATER SUPPLY SOURCES

The Marshfield Water Department relies solely on groundwater as a public water source. The Water Department operates 14 wells (Table 2-2), with a combined safe yield of 6575 gallons per minute (Table 2-3). Union Street well #2, with safe yield of 350 gpm, is only used during peak demand periods.

EMERGENCY SOURCES

Parsonage No. 1 is designated for emergency use only. The well has a yield of 275 gallons per minute.

POTENTIAL FUTURE SOURCES

There are four potential new well sites identified in Marshfield. Two are located north of Ferry Street and west of Church Street. Another is off of Pioneer Trail. The last is located east of Route 3A, north of the Fairgrounds. It is not yet known how much water these sites may yield.

Figure 2-1

HISTORIC WATER DEMAND, 1982-1986

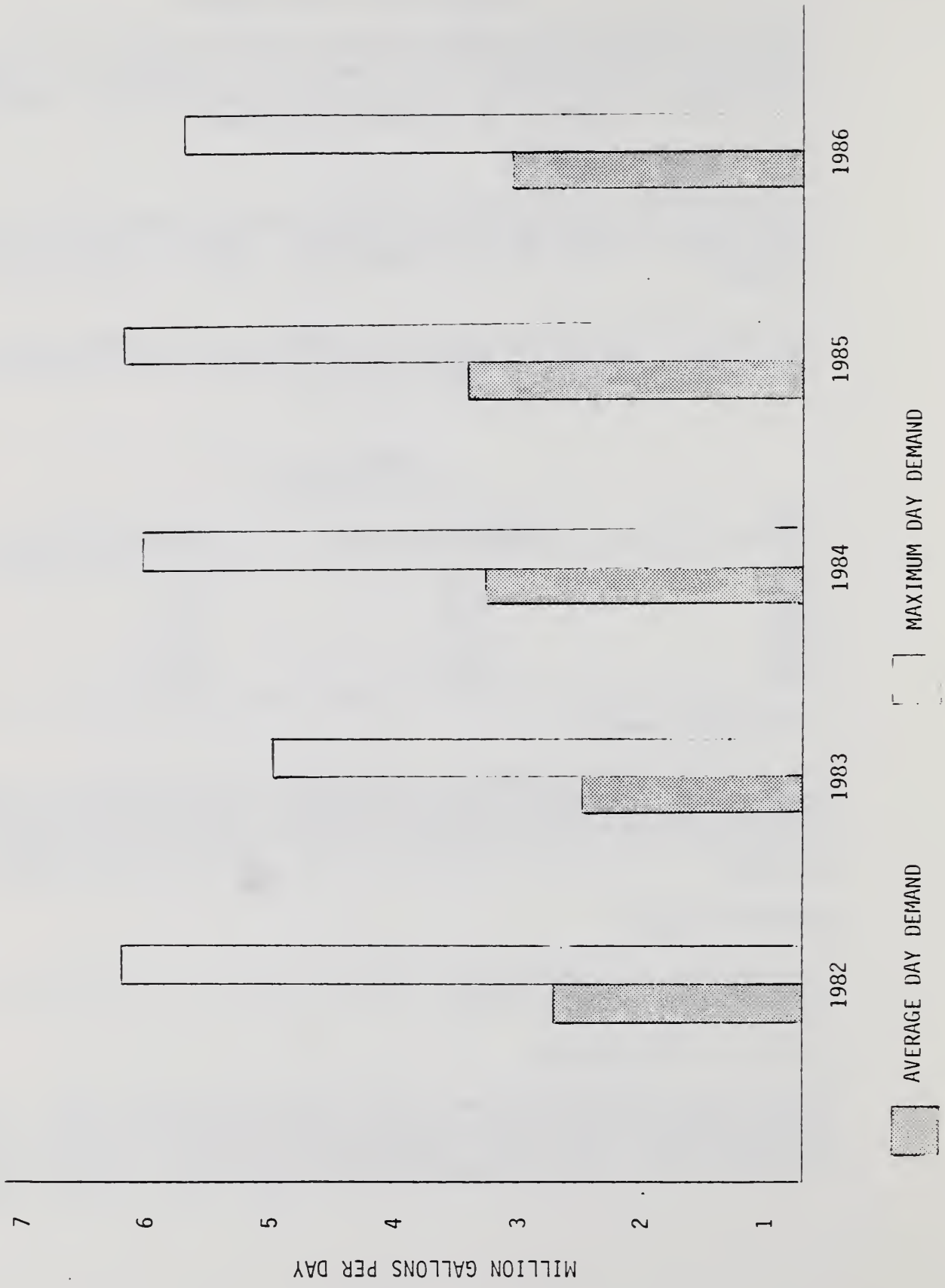


TABLE 2-2
MARSHFIELD MUNICIPAL WELLS

	Type	Safe Yield (gpm)	Size	Depth	Year Installed
Furnace Brook No. 1	gravel pack	700	18" x 12"	95'	1946
Furnace Brook No. 2	gravel pack	400	18" x 12"	92'6"	1950
Furnace Brook No. 3	gravel pack	300	24" x 18"	62'	1956
Furnace Brook No. 4		1000	24"	124'	1960
South River St.		350	24"	43'	1971
School St.		300	18"	73'	1972
Webster #1	gravel pack	400	24"		1974
Webster #2	tubular well	225	6"		1979
Ferry St.	gravel pack	400	18"		1979
Church St.	gravel pack	575	24"	71'	1982
Mt. Skirgo	gravel pack, tubular well,	300	12',2.5", 36"	35'	1927
Parsonage No. 1	gravel pack	275	18	30'	1938
Union St. #1	gravel pack	1,000	24"	125'	1985
Union St. #2	gravel pack	350			1986

TABLE 2-3
MARSHFIELD WATER COMPANY WATER SOURCES

Source	Safe Yield (gpm)	Percentage of Total
Furnace Brook No. 1	700	10.6
Furnace Brook No. 2	400	6.1
Furnace Brook No. 3	300	4.6
Furnace Brook No. 4	1,000	15.2
South River St.	350	5.3
School St.	300	4.6
Webster #1	400	6.1
Webster #2	225	3.4
Ferry St.	400	6.1
Church St.	575	8.7
Mt. Skirgo	300	4.6
Parsonage No. 1	275	4.2
Union St. #1	1,000	15.2
Union St. #2	350	5.3
System Total	6,575	100.0%

WATER QUALITY

In August of 1986, 4 town wells were shut down due to contamination, Furnace Brook wells 1,2, and 3, and the South River Street well:

Date closed	Well	Chemical Contaminant	Content
8-5-86	Furnace #3	Benzene	4.62 ppb
8-19-86	Furnace #1	TCE	29 ppb
8-20-86	South River St.	TCE	5.3 ppb
8-20-86	Furnace #2	TCE	6.3 ppb

The closure of these 4 wells caused a loss of 1.4 million gallons of water per day or 25% of the total water supply. One well was slightly contaminated but not shut down; this one was the Furnace Brook well No. 4, which showed traces of less than 5 parts per billion of PCE. A DEQE funded contamination study is currently being conducted to determine the cause and extent of contamination.

WATER TREATMENT

Union Street No. 1 is presently treated with lime. Lime treatment is expected to reach all wells by 1988. Furnace Brook Well No. 1 is being treated temporarily with carbon filtration and chlorination.

DISTRIBUTION AND STORAGE

The distribution system consists of 92 miles of water mains, 97 percent of which are six-inch in diameter or larger. There are about 200 meters in use.

Storage is provided by two standpipes and a concrete reservoir with a combined capacity of 3.65 million gallons. These facilities are:

Storage Facility	Capacity In Million Gallons
Pudding Hill	0.667
Forest Street	2.1
Telegraph Hill	0.888

TABLE 2-4

MARSHFIELD DRINKING WATER QUALITY IN 1986 (mg/l)

	MCL[1]	Furnace Brook No. 1	Furnace Brook No. 2*	Furnace Brook No. 3*	Furnace Brook No. 4	South River Street	School St.	Webster #1	Webster #2	Ferry Street	Church Street	Mt. Skirgo	Parsonage No. 1*	Parsonage No. 2*	Union No. 1
Turbidity		0.1	0.6	0.3	0.2	0.2	0.1	2.9	0.2	0.2	0.2	0.2	0.6	0.9	0.2
Sediment		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Color		5	7	0	5	0	5	0	10	0	7	5	5	5	7
Odor		0	0	0	0	0	0	0	0	0	0	0	0	0	0
pH		6.0	6.1	6.2	6.2	6.2	6.3	6.2	6.2	6.4	6.4	6.2	6.3	6.4	6.8
Alkalinity-Total ($CaCO_3$)		8	11	15	16	11	16	18	16	11	11	12	19	17	26
Hardness ($CaCO_3$)		27	36	32	28	26	23	37	78	11	16	14	30	31	27
Calcium (Ca)		6.1	8.3	7.0	6.4	6.1	6.4	7.3	17	2.4	3.6	3.0	6.3	6.6	5.5
Magnesium (Mg)		2.9	3.7	3.3	2.9	2.6	2.9	4.7	8.5	1.2	1.7	1.4	3.3	3.2	
Sodium (Na)		23	32	20	13	12	14	16	25	9.3	8.4	11	18	17	8.5
Potassium (K)		0.8	0.9	0.9	0.6	0.8	1.4	.6	.5	.8	1.4	0.6	0.5	0.8	
Iron (Fe)	0.3	<.04	.00	.00	.05	<.04	<0.4	.00	.04	<.04					
Manganese (Mn)	0.05	<.02	.02	.00	.03	<.02	.02	<.02	.16	<.02	.02	<.00	.00	.02	.00
Sulfate (SO_4)	250	10	14	10	8	11	8	12	18	5	<.02	6	13	8	5
Chloride (Cl)	250	43	58	37	21	21	21	26	77	10	13	13	31	26	5
Spec. cond. (microhmhs/cm)		193	244	180	129	111	129	171	322	64	78	78	150	135	
Nitrogen (ammonia)		<0.02	.03	.02	<0.02	0.02	.02	<0.02	0.02	.02	<0.02	<0.02	.02	.03	<0.02
Nitrogen (nitrite)		1.1	.06	1.3	1.6	0.4	1.6	3.5	<1.0	.2	0.3	1.2	1.4	0.	
Nitrogen (nitrate)		<.002	.000	.000	<0.02	<.002	.002	.002	<.002	.002	<.002	.000	<0.01		.001
Copper (Cu)	1.0	.06	.05	.00	.02	.04	.06	.06	.07	.04	<.02	<.02	.03	.03	.03

*1985 data

[1]Maximum Contaminant Levels as established by the Safe Drinking Water Act.

Chapter 3

WATER RESOURCES AND ENVIRONMENTALLY SENSITIVE AREAS

This chapter describes the characteristics of the natural environment within the town of Marshfield and their significance to the public water supplies. The areas addressed are: watershed areas, geology, groundwater resources, soils,and wetlands.

Watershed Areas

The town of Marshfield lies within the drainage basins of the North and South Rivers, both of which flow east into the Atlantic Ocean along the Marshfield coast. The town's municipal wells are located within six subbasins which cover about one-third of the town, primarily in the central and western sections. (See Map 1.) The subbasins and their sizes are as follows:

Furnace Brook	1450 acres
Littles creek	900 acres
Fairgrounds Basin	1300 acres
Green Harbor Brook	1380 acres
Hall's Pond	475 acres
Webster House	245 acres
TOTAL	5750 acres

These watersheds comprise most of the upland freshwater drainage in the town. Most of the areas outside these watersheds drain into the saline waters of coastal wetlands or the ocean.

Geology

Marshfield's geology consists of bedrock which is covered by varying depths of unconsolidated materials which were deposited by ice age glaciers. The surficial materials can be classified into two major groupings: till and stratified drift deposits. Till is an unsorted, mixture of various grain sizes, from clay to sand to boulders. Most till in Marshfield was deposited as a ground moraine, or forms small oval shaped hills called drumlins. These materials are not very permeable, and therefore are not favorable aquifers. Stratified drift deposits include sand and gravel deposits which are well sorted into layers of somewhat uniform grain size, making them both porous and permeable. These qualities make them favorable for storage and transmission of significant quantities of water. Most of these formations were deposited by glacial meltwaters in the form of outwash plains, kames, kame deltas, and ice-channel deposits. Stratified drift deposits are frequently found as "buried valleys," where meltwater deposits fill in depressions in the underlying bedrock which represent the pre-glacial drainage pattern. In Marshfield, the Furnace Brook aquifer is an example of a buried valley deposit.

GROUNDWATER RESOURCES

The occurrence of groundwater in the town is controlled by the surficial and bedrock geology. Aquifers which yield sufficient quantities of water for public supply wells are generally found in thick deposits of sand and gravel, which are capable of storing and transmitting significant amounts of water. The thickest areas of such permeable deposits are generally found in buried valleys.

According to the U.S. Geological Survey Hydrologic Atlas, there is a band of moderately to highly favorable aquifers in the central and western portion of the town (see Map). The most favorable portion of the aquifer corresponds to the buried valley deposits of the Furnace Brook watershed and the kame deposits in southern Marshfield. The majority of the town's wells are located in these areas.

The town's geotechnical consultant, Goldberg, Zoinio, Dunnicliff (GZD), has conducted more detailed evaluations of the aquifers in Marshfield. The studies included generalized mapping of aquifer characteristics and recharge potential, as well as an assessment of the geology, aquifer characteristics, and groundwater availability in each of the six aquifer units identified. The GZD mapping of the aquifers was used to delineate the study area for this groundwater protection study. However, these boundaries do not reflect the areas of contribution to the town's pumping wells, so they should not be used as the basis of regulatory protection measures. More detailed hydrogeologic studies are needed to delineate a protection district.

The GZD aquifer mapping shows that about 6500 acres, or one-third of the town, lies within the favorable aquifer areas. These areas are the most sensitive part of town with regard to Marshfield's water supplies. Any sources of pollution or contamination within these areas may potentially affect the quality of the town's drinking water.

Soils

There are two major solid associations within Marshfield. The Scituate-Essex-Merrimac association occupies the upland portion of town. These soils are deep, coarse, sandy loams underlain at a depth of 10 to 30 inches by firm, coarse glacial till. Most of the town's wells lie within this soil association. The coastal area and North and South River corridors fall mostly in the Tidal Marsh-Dune Land-Coastal Beach Association. Some areas consist mainly of organic matter, others of mineral material, chiefly silt and clay.

WETLANDS

Wetlands are low-lying, transitional areas between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetland areas have several unique functions and values with respect to water supplies: they filter pollutants entering streams, provide temporary storage for flood control, supply base flows for streams and rivers, and supply water to the surface system in periods of limited rainfall. In Massachusetts wetlands are delineated by the presence of wetlands vegetation under the state Wetlands Protection Act.

According to the MacConnell land use maps about 300 acres or 2 percent of the town is in freshwater wetlands. Freshwater wetlands cover about 168 acres of the aquifer study area. There are also about 2,380 acres of salt water wetlands in Marshfield, about 336 acres of which lie over the aquifer area.

Chapter 4

LAND USE AND WATER SUPPLY IMPACTS

This chapter describes the uses of land in the town of Marshfield, and examines the potential impacts of the land use on the quality and quantity of water supply sources in the town. After a brief review of the recent growth and development trends of the town, water supply impacts will be addressed in terms of the potential sources of contamination associated with land use.

HISTORIC DEVELOPMENT TRENDS

This section reviews the last three decades of growth and development in Marshfield. This perspective aids in understanding the existing land uses, as it provides information on past activities which today may affect the water supply sources.

Table 4-1 summarizes the population and population density of Marshfield between 1950 and 1980. The data shows that the 1980 population is six times what it was in 1950.

Table 4-1
Population Data, 1950-1980

Year	Population	Population Density pop. per sq. mile	% Change
1950	3,267	112	-
1960	6,748	231	106
1970	15,223	522	126
1980	20,916	717	37

The historic population growth in Marshfield is reflected in the changing land uses in the town over the last 30 years. The data on historic land use was taken from a study by William MacConnell of the University of Massachusetts, who has classified and mapped land uses by interpretation of aerial photography. The minimum parcel size mapped was three acres. Map 2 shows land use in 1980, and Table 4-2 shows the breakdown of land uses for 1951 and 1984. Of note is that "developed" land uses more than doubled from 2,278 to 5,910 acres. The largest gain in acres was residential which increased 2,757 acres. The 397 percent growth of commercial land was the greatest percentage growth. "Undeveloped" land uses dropped 3,637 acres, or 22 percent. The largest loss was forest land which dropped by 2,169 acres. Agricultural land with a percentage change of 70, was the greatest percent change calculated.

Table 4-2

MARSHFIELD LAND USE CHANGE, 1951-1984[1]

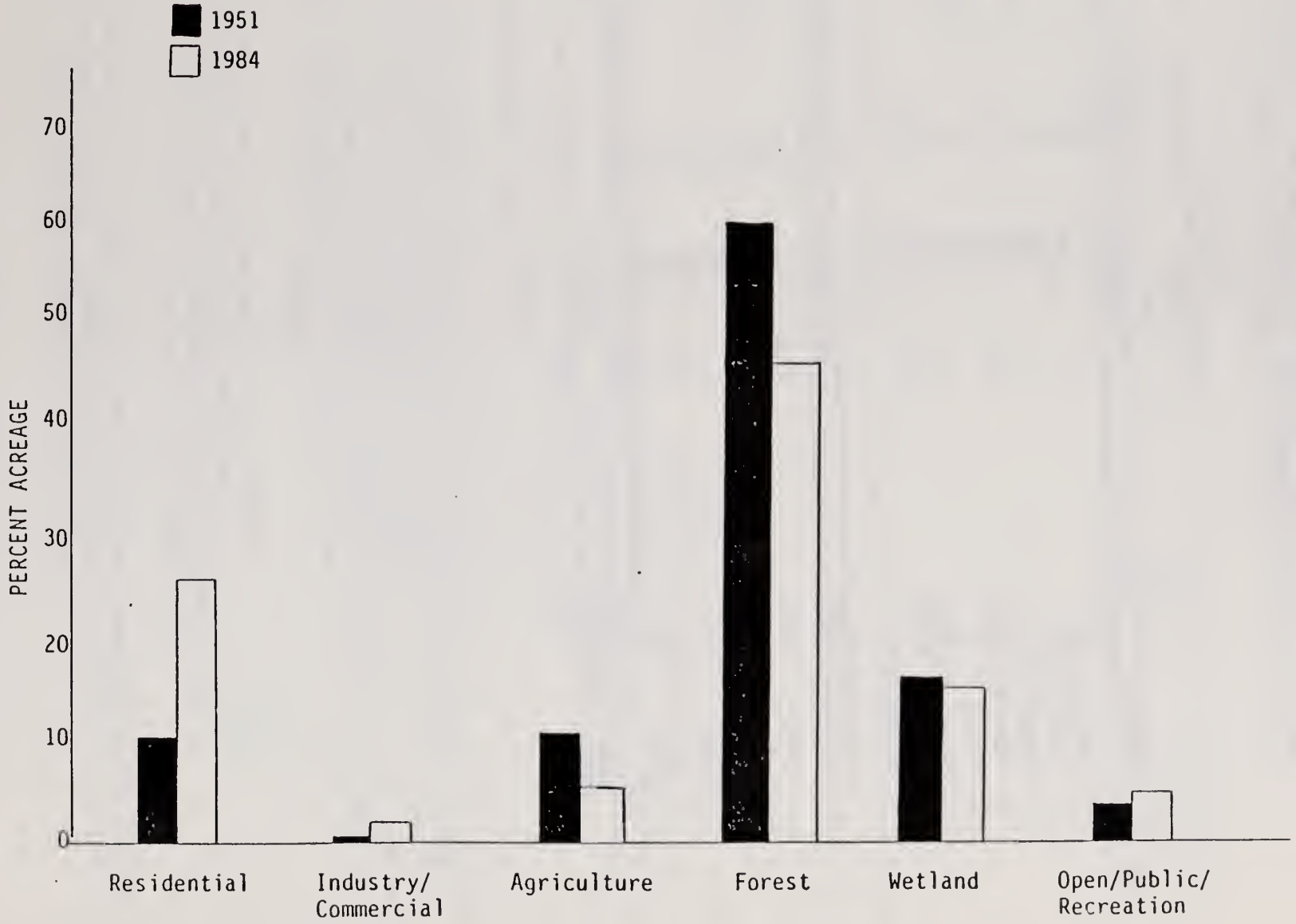
Land Use	1951 (acres)	1984 (acres)	Change (acres)	Percent Change
Residential	2,042	4,799	2,757	135
Industrial	14	25	111	78.5
Commercial	40	199	159	397
Transportation	18	80	62	344
Mining[2]	--	256	--	---
Waste Disposal	--	20	--	---
Open and Public Recreation[2]	164	191	27	16.4
	---	340	--	---
Total developed land	2,278	5,910	3,632	319
Forest	10,844	8,675	-2,169	-20
Salt Wetlands	2,958	2,380	-578	-20
Fresh Wetlands	105	300	+195	+186
Water	---	565	---	---
Agriculture	2,231	663	-1,568	-70
Open	262	185	-77	
Total undeveloped land	16,400	12,768	-3,637	-22.1
TOTAL	18,678	18,678	-	-

[1]Source: MacConnell, University of Massachusetts

[2]Mining and Recreation were not included in the 1951 survey.

Figure 4-2

MARSHFIELD LAND USE CHANGE, 1951-1984



SUMMARY OF EXISTING LAND USE

The current land use in the town has been classified for analysis and mapped in Map 2. Table 4-3 shows the acreage of each land use category in 1984. Marshfield is 31.9 percent "developed", of which 26 percent is residential. Industrial and commercial represent less than 2 percent each. About 68 percent of the town is "undeveloped" of which 46 percent is forest land. Wetlands represent nearly 15 percent and agriculture 3.5 percent.

Table 4-3
MARSHFIELD LAND USE, 1984

LAND USE	ACRES	PERCENT
Residential	4,799	26
Industrial	25	.10
Commercial	199	1.0
Transportation	80	.40
Mining	256	1.3
Waste Disposal	20	.10
Open and Public	191	1.0
Recreation	340	2.0
Developed Land	5,910	31.9
Forest	8,675	46
Salt Wetlands	2,380	13
Fresh Wetlands	300	1.6
Water	565	3.0
Agriculture	663	3.5
Open	185	1.0
Undeveloped Land	12,768	68.1
Total	18,678	100.0

The aquifer which supplies Marshfield's wells covers approximately 6,500 acres or about 35 percent of the town's total acreage (Table 4-4). About 45 percent of the aquifer area is developed. Most of this land is residentially developed, 35 percent. Undeveloped lands occupy 55 percent of the aquifer area. Of this, forested lands comprise the largest share at 43 percent.

Table 4-4
Marshfield Water Supply Aquifer
Land Use, 1984 (Acres)

Land Use	High Favorability Aquifer	Medium Favorability Aquifer	Total Aquifer Area	Percent of Total Aquifer Area
Residential	799	1457	2256	35
Industrial	12	2	14	0.2
Commercial	50	36	86	1.0
Transportation	9	7	16	0.2
Mining	85	149	234	3.7
Waste Disposal	6		6	0.1
Open & Public	51	66	117	1.8
Recreation	110	93	203	3
Developed Land	1112	1810	2932	45
Forest	820	1975	2795	43
Salt Wetlands	42	294	336	5.3
Fresh Wetlands	95	73	168	2.4
Water	16	52	68	1.1
Agriculture	28	116	144	2.2
Open	34	28	62	1.0
Undeveloped Land	1035	2538	3573	55
Total	2157	4348	6505	100

LAND USE/WATER SUPPLY IMPACTS

Land uses within the water supply watershed can affect both water quality and water quantity through physical alteration of the environment which changes drainage patterns and rates of runoff and recharge, and through discharge of contaminants to surface or groundwater. In this chapter, the potential impacts of land uses on water supplies are analyzed in terms of the physical alterations and chemical contaminants associated with each. For each of these potential sources of contamination, the analysis presents:

- the characteristics and water supply impacts;
- the land uses associated with each; and
- existing conditions in Hingham describing the prevalence of these land uses within the water supply watershed.

The potential sources of contamination addressed are: underground fuel storage tanks, wastewater, road salt, leachate, hazardous wastes, pesticides, mineral extraction. These potential sources are shown on Map 3.

As shown in Table 4-4 and Figure 4-3, approximately 55 percent of the aquifer is undeveloped. Much of this land has potential for future development. Such primarily undeveloped property provides a natural recharge area for groundwater and surface water, and this has no adverse effect on either the quantity or quality of drinking water supplies. The developed land uses in the watershed have the potential to cause impacts on the quantity and quality of water supply in Marshfield. The relationship between land uses and potential drinking water impacts is summarized in Figure 4-4 and described in the following section.

Figure 4-3

Marshfield Aquifer Area
Land Use Breakdown, 1984

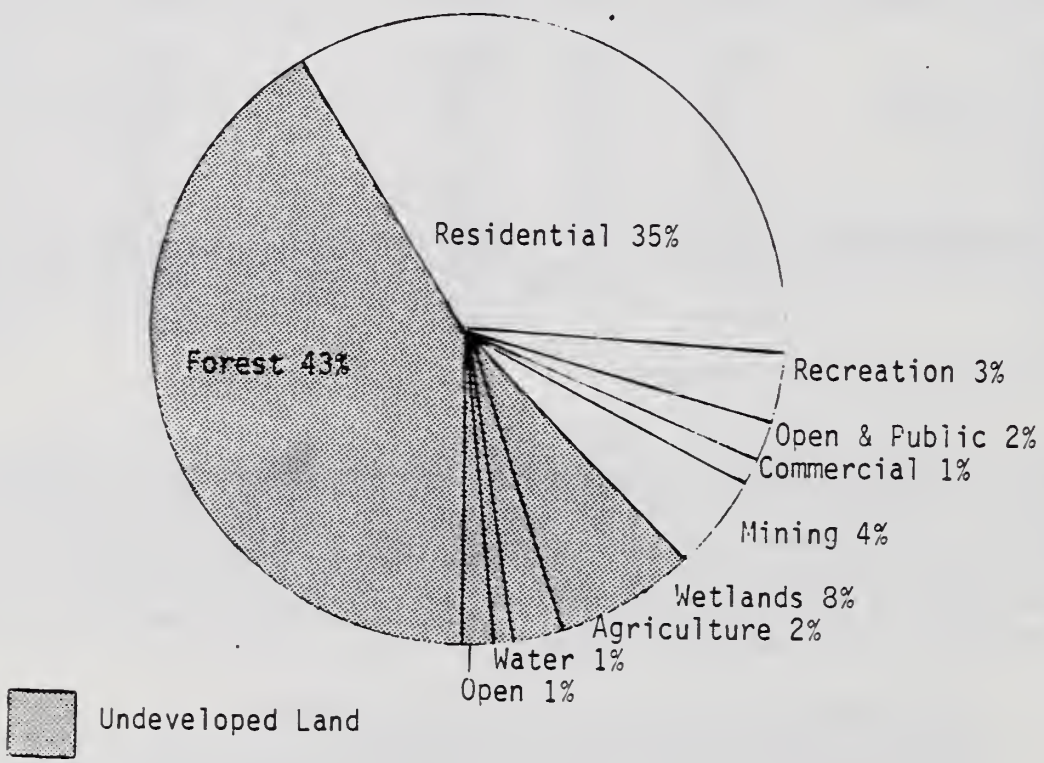
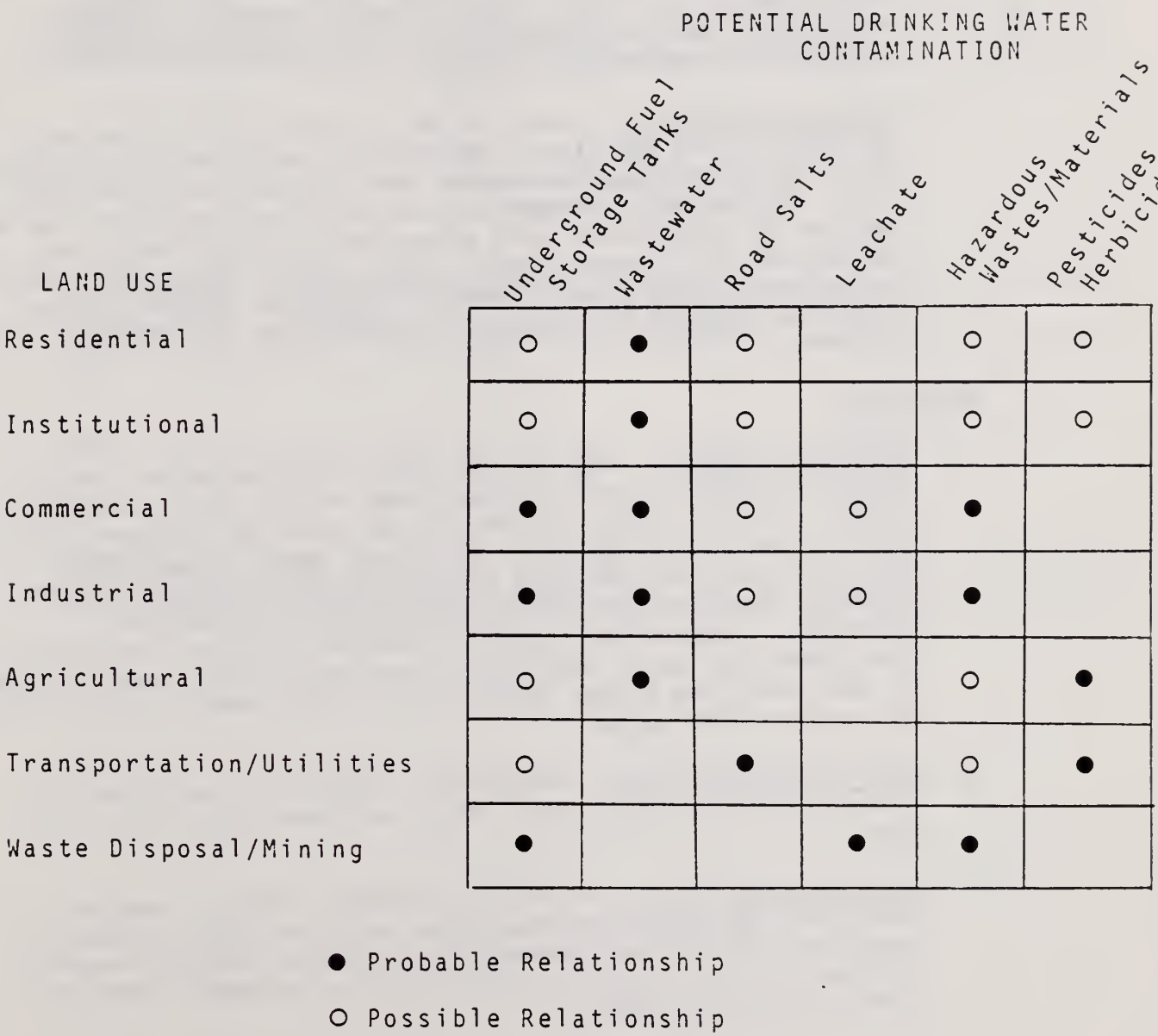


Figure 4-4

EFFECTS OF LAND USES ON WATER SUPPLY SOURCES



Potential Sources of Contamination

1. Underground Fuel Storage

a. Potential Impacts. Leakage of tanks or piping which are subject to corrosion or puncturing can lead to contamination of water resources. Unprotected steel tanks have an average life expectancy of 15 years in corrosive soils. Most soil types in Massachusetts are corrosive. Once it leaks, gasoline can move through the ground and contmainate public or private wells. A small amount of fuel can contaminate much water, since concentrations of more than several parts per billion are considered unsafe.

b. Land Use Associations. Fuel storage is typically associated with service stations, fuel companies, auto dealerships, public facilities bus and truck fleets, schools, churches and other institutions and residences where large underground tanks are installed for additional storage.

c. Existing Conditions. There are 29 facilities (auto sales and service) storing gasoline in Marshfield, which includes 96 tanks. 46 of these tanks are known to be more than 15 years old (Table 4-5). Residences, institutions, and small businesses are storing fuel in 225 underground tanks throughout the town (Table 4-6). Several are in close proximity to town wells. The total volume of fuel stored underground in Marshfield is about 450,000 gallons, which includes 319,000 gallons of gasoline and 130,790 gallons of fuel oil.

2. Wastewater

a. Potential Impacts. Both surface water and groundwater supplies can be affected by problems associated with disposal of sanitary wastes. Failing septic systems can be caused by improper siting, installation or maintenance. Soil type, depth to bedrock and depth to the water table can be major factors in septic system failure. Such failures can introduce excessive nutrients, chlorides, bacteria and household chemicals into soil which can then leach into water supplies. According to DEQE, septic systems on lots less than 40,000 square feet in area have the potential to contaminate groundwater.

b. Land Use Associations. Residential, commercial, and industrial land use gnerate wastewater. These land uses occupy 27% of the town.

c. Existing Conditions. The entire watershed area is unsewered. Therefore, the watershed area relies soley on septic systems to treat sanitary wastes. Consequently, the town's major concern relative to septic systems is that they are properly installed, operated and maintained.

Table 4-5
Summary of Underground Fuel Licenses--Gasoline

Age of Permit (years)	Amount of Fuel Storage Permitted (Gallons) 1000-6000	60001-12000	Unknown	Total
0-5	13	4		17
6-10	9	3		12
11-15	10	5		15
16-20	15	2		17
21-	24	2	2	29
unknown	6		1	6
Total	77	16	3	96

Table 4-6
Summary of Underground
Fuel Permits--Fuel Oil

Age of Permit (years)	Amount of Fuel Storage Permitted (Gallons) 0-999	1000-1999	2000+	Total
0-5	17	13	1	31
6-10	87	15	8	110
11-15	56	14	3	73
unknown	5	4	2	11
Total	165	46	14	225

Table 4-7

MARSHFIELD UNDERGROUND FUEL STORAGE LICENSES

Name & Address	No. of Tanks	Capacity of Tank (Gallons)	Date Installed	Fuel
All-Town Inc.	1	3,000	1980	gas
43 Lone St.	1	3,000	1980	diesel
Bernard Ayre (Texaco)				
C.K. Smith & Co., Inc.	1	10,000	1981	gas
2170 Ocean St.	2	8,000	1981	gas
Biagini, Inc.				
288 Pleasant St.	1	1,000	1952	gas
Boch Realty Trust	1	3,000		gas
975 Plain St.	1	3,000		gas
	1	2,000		fuel oil
	1	1,000		waste oil
Cedar View Filling Station	?	9,000	?1952?	?
480 Careswell St.				
Cyr Oil Company (Texaco)	4	4,000	1965	gas
1892 Ocean St.	1	500	1965	gas
John N. Flagg, Jr. Inc.	1	2,000	1982	gas
750 Webster Street	1	5,000	1982	diesel
Manuel Francis & Son, Inc.				
dba - Green Harbor Golf Club	1	2,000	1984	gas
624 Webster	1	5,000	1969	gas
Robert Frasca (Marshfield B.P.)				
969 Ocean St.				
High Point Realty Trust	1	1,000	1958	gasoline
900 Webster St.	1	1,000	1964	diesel
	1	1,000	1974	kerosene
	1	2,000	1974	gasoline

Table 4-7 (continued)

Name & Address	No. of Tanks	Capacity of Tank (Gallons)	Date Installed	Fuel
Humarock Marina,Inc.	2	1,000	1953	gasoline
Sea & Ferry Sts.	1	2,000	1953	gasoline
	1	4,000	1961	gasoline
Karl F. & Jutta Koertje	1	4,000	1978	diesel
1944 Main St.	2	4,000	1978	gas
Marina Harbor Corp.	1	10,000	1958	marine gas
Green Harbor Marina	1	10,000	1965	marine gas
Dyke Rd.	2	3,000	1978	marine gas
Paul Maguire Chevrolet	1	3,000	1968	gas
923 Plain St.	1	2,000	1968	bulk oil
	1	1,000	1968	waste oil
Edward F. McDonald	1	4,000	1945	gas
d/b/a Marshfield Auto Body	1	4,000	1945	gas
221 Summer St.				
Marshfield Country Club	1	5,000	1974	gas
Nash Precast d/b/a	1	10,000	1969	gas
Clay Pit Road & Ferry St.	1	5,000	1969	diesel
Mobil Oil Corp.	1	5,000	1972	gas
1933 Ocean St.	1	9,000	1981	gas
(Rte. 139)	1	5,000	1982	gas
	2	4,000	1982	gas
Old Colony Petroleum Co.	1	6,000	1974	gas
2148 Ocean St. (Rte. 139)	4	4,000	1974	gas
Clark Philips	1	5,000	1970	gas
Ocean St. & Plymouth Ave.	1	5,000	1970	gas
Anthony Pomella	2	3,000	1965	gas
Fieldston Texaco	2	4,000	1965	gas
893 Ocean St.				

Table 4-7 (continued)

Name & Address	No. of Tanks	Capacity of Tank (Gallon)	Date Installed	Fuel
Rorke & Dennehy				
BFI	1	10,000	1973	gas
975 Plain St.	1	3,000	1973	gas
Shell Oil Co.	2	6,000	1967	gas
2126 Ocean St.	1	8,000	1967	fuel oil
	1	500	1967	gas
Sun Oil Co.	4	6,000	1982	diesel
2054 Ocean St.	1	1,000	1982	waste oil
	1	1,000	1982	heating oil
Taylor Marine				
Corp.	1	8,000	1973	diesel
95 Central St.	1	6,000	1982	gas
Plain St.				
Realty Trust	2	10,000	1980	heating oil
Williams Coal & Oil	1	1,000	1980	diesel
717 Plain St.	1	500	1980	LP Gas
Mary E. Williams				
(Mary's)	1	1,000	1959	marine-
2205 Main St.	1	4,000	1959	gas
Town of Marshfield	1	10,000	1974	gas
Highway Garage	?	12,000	1973	diesel
870 Moraine St.				
Town of Marshfield				
Airport	2	6,000	1967	aviation
Marshfield Municipal				gas
Airport				
Old Colony Lane				

Name & Address	No. of Tanks	Capacity of Tank (Gallons)	Date Installed	Fuel
Town of Marshfield DPW	1	8,000	1976	gas
	1	10,000	1973	gas
	1	2,000	1962	gas
	1	2,000	1962	gas
	1	4,000	1962	gas
	1	3,000	1962	gas
Settles Glass Realty Trust Route 139	2	Unknown	1963	gas
New England Telephone Carolina Hill	1	500	?	?
	1	1,000	?	?
Patriot Yachts 1240 Ferry St.	1	1,000	1966	gas
	1	2,000	1966	gas
	1	3,000	1966	gas

Table 4-8

MARSHFIELD
HEATING OIL PERMITS-UNDERGROUND STORAGE

NAME	ADDRESS	CAPACITY OF TANK	INSTALLED
Edward McDonald	221 Summer	1,000	1986
Thomas Robinson	426 Main	300	1986
Cerco Inc.	61 Warren	500	1985
Cerco Inc.	75 Warren	300	1985
Charles Ruisi	Lot #3 Warren's Landing	500	1985
Williams Coal & Oil	717 Plain St.	500	1985
Roland Leary Co.	Lot 38 Pudding Hill	1,000	1985
RL Seaberg Assoc. 1,000	Lot 8 Rocky Reach Farm 1985		
DiRicco Bldrs.	116 Rocky Reach Farm	1,000	1985
Charles Ruisi	70 Warren Ave.	500	1985
Cut River Bldrs.	Lot #4 Grove Run	260	1985
Roland Leary Co.	151 Pudding Hill	1,000	1985
Richard Maurano	Ferry Street	300	1985
Roland Leary Co.	Lot 43 Pudding Hill	1,000	1985
Williams Coal & Oil Co.	717 Plain St.	1,000	1985
R.L. Seaberg Associates	1235 Union St.	2,000	1984
Jones TV	Webster	500	
M. Francis (Green Harbor Golf)	624 Webster	1,000	
Cut River Realty	Smoke Hill Ridge	300	
Everett	699 Union	300	
Green Harbor Golf (Workshop)	624 Webster	1,000	
Patrick Vaughn	53 Carolina Terrace	350	1983
Robert Junior	Holly Road	300	1983
Michael Corwin	82 Bryant	1,000	1983
James Bartley	Blacksmith Lane	500	1983
Dick Connoly Brian Fletche	111 Summer Street	1,000	1983
Armstrong	Lot 22, #46, Smoke Ridge	500	1983
Robert Junior	Lot 451 Holly Road	300	1983
Robert Green	Lot 249 Grace Lane	300	
C.H. Emilson	236 Cornhill Lane	1,000	1983
Dick Frehill	84 Travelers Lane	300	1983
Patrick Stapleton	Churchill Hgts.	1,000	1982
Richard Ossolinski	123 Winslow	2,000	1982
1st Church Christ Scientist	Old Main Street	500	1981
David Hill	McGrath Residence	1,000	1981
Don Dixon & Sons	Lot #19, Carolina Trail	300	1980

Table 4-8 (continued)

NAME	ADDRESS	CAPACITY OF TANK	YEAR
Mrs. George Paul	511 Spring St.	2,000	1980
Paul Callahan	310 Furnace St.	2,000	1980
Peter Lanzillotta	70 Damon's Pt. Rd.	?	1980
Peter J. Collins	Capt. Luther Little	300	1979
James Rindone	1067 Union Street	1000	1979
Robert Jordan	Grace Lane (Lot 250)	300	1979
Charles Reeves	Flower Hill Lane	1000	1979
Steven Anderson	Gotham Hill (Lot 30)	300	1979
Dennis M.	A-19 Presidential	300	1979
Construction	Circle	300	1979
R. Maurano	Furnace St.	300	1979
Michael Ennis	Bernard Rd. (off	500	1979
Cornelius Brosman	50 Bayview Rd.	2000	1979
Larry Broberg	Old Mt. Skirgo	300	1979
Richard McNiel	Carolina Trail (Lot 14)	300	1979
Steve Whoriskey	Daniel Webster	330	1979
	Estates (Lot 154	330	1979
Frank J. Penza	Union St. (Lot 145)	300	1979
Gordon Kennedy	Damon Pt. Rd.	300	1979
Robert Junior	Sherman Way (Lot 8)	1,000	1979
Marshfield Fair	Main Street	275	1979
Assn.	Presidential Circle (Lot A-11)	300	1979
Norman Ford	Carolina Trail (Lot 6)	300	1979
D. Roderick	220 Damon Point Rd.	320	1979
David Braga	947 Ferry St.	1,000	1979
William Berry	Furnace St. (Lot 11)	300	1979
R.H. Page	Stagecoach Dr.	300	1979
	(Lot 297)	300	1979
Marshfield BP	969 Ocean	1,000	1979
Bresmarc Homes	Furnace St. (Lot 3)	300	1979
Robert Junior	Pine St. (Lot 4)	1,000	1979
William Chase	Gotham Hill Dr. (Lot 21)	300	1979
Robert Junior	Old Mt. Skirgo (Lot 4)	300	1979
Robert Baker	Carolina Trail (Lot 8)	300	1979
Olav N. Cook	109 Oakleef	410	1979
Robert Junior	Old Mt. Skirgo (Lot 1)	300	1979
David Hill	Main St.	300	1979
Gordon Kennedy	Juniper Rd.	300	1979
R. McNeil	Carolina Trail (Lot 29)	300	1979
Robert Junior	Carolina Trail (Lot 21)	500	1979

NAME	ADDRESS	CAPACITY OF TANK	DATE INSTALLED
Larry Broberg	Lot 2 Old Mt. Skirgo	3,000	1978
Frank J. Penza	Lot 145, Union Street	300	1978
R.D. Ross Company	Lot 304, Steam Boat Dr.	300	1978
Marshfield BP	969 Ocean St., 7 Guage	1,000	1978
Dennis Mason	#309 Steamboat Ln.	300	1978
Norman Ford	Lot #7, Ferry St.	3,000	1978
Charles Nardone	Lot #10, Pioneer Tr.	300	1978
Stephen Armstrong	Lot #4, Pioneer Tr.	300	1978
Charles Nardone & Company	Lot #7, Pioneer Tr.	300	1978
Charles Nardone	Lot #8, Pioneer Tr.	300	1978
Stephen Armstrong	Lot #5, Pioneer Tr.	300	1978
Charles Nardone	Lot #6, Pioneer Tr.	300	1978
Norman Bird	44 Bay Pt. Path	1,000	1977
River View Homes Inc.	Lot 18, Sea Flower Lane,	275	1977
River View Homes Inc.	Lot 16, Sea Flower Lane,	275	1977
William Ritchie	Lot 4, Moraine St.	350	1976
A.J. Lane Co.	Lot 218, Peterson Path	300	1976
Bill Ritchie	Lot 14, King Philip Path	300	1976
Country Shore Homes	Lot 11, Ladyslipper Lane	300	1976
Robert Jordon	216 Peterson Path	300	1976
Kevin Legge	Captain LutherWay	350	1976
Parkwood Realty Trust	Lot 12A, Bartlett	1,000	1976
Country Shore Homes	Lot 8, Ladyslipper Lane	300	1976
Bresmare Inc.	Lot 19, King Philip Path	300	1976
Country Shore Homes	Lot 10, Ladyslipper Lane	300	1976
899 Washington St. Realty Trust	Lot 12, King Phillips Path	350	1976
Country Shore Homes	Lot 15, Flames Rd.	300	1976
Bresmare Inc.	Lot 26, King Phillip Path	350	1976
William Chase	Lot 22, Gotham Hill	300	1976
Stephen Wildes	792 Forrest St.	300	1976
A.J. Lane Co.	Lot 246, Grace Lane	300	1976
Mrs. Elizabeth MacLean	Spring St.	275	1976
			1976
Robert Jordon	Lot 206, Peterson Path	300	1976
Fred Covell	Lot 1, Main St.	275	1976
John Silipo	Bakers Lane	300	1976
Joseph Alfonso	Lot 18, Sea Flower Ln.	300	1976
Robert Jordan	Lot 207, Peterson Path	300	1976
Joseph Alfonso	Lot 21, Seaflower Lane	300	1976
Bresmare Homes	Lot 32, King Phillip Path	300	1976
William Ritchie Jr. Inc.	Lot 3, Moraine St.	300	1976

Table 4-8 (continued)

NAME	ADDRESS	CAPACITY OF TANK	DATE INSTALLED
Country Shore Homes	Lot #12, Sherman Way	300	1976
Donald A. Henderson	Lot #17, Sherman Way	300	1976
899 Washington St. Realty Trust	Lot #27, King Philip	300	1976
William Chase	Lot #10, Gotham Hill Dr.	300	1976
Steve Whoriskey	Lot #1, Furnace St.	1,000	1976
William Chase	Lot #15, Gotham Hill	300	1976
William Chase	Lot #20, Gotham Hill	300	1976
Norman Ford	Lot #18, King Philips	300	1976
Mary B. Tangney	Lot 213, Peterson Path	500	1976
Bresmarc Inc.	Lot 9, Furnace St.	3,000	1976
Clyde Leaman	350 Main St.	275	1976
Marshfield Drive-in Cleaners	Rte. 139	1,000	1976
A.J. Lane Co.	Lot 205, Peterson Path	300	1976
A.J. Lane Co.	Lot 211, Peterson Path	300	1976
Construction Corp. of Milton	1801 Ocean Ave.	2,000	1976
Mark Melvin	1944 Ocean St.	1,000	1976
Peter Collins	Lot #3, Cromwell Hill	300	1976
899 Washington St. Realty Trust	Dwight Rd.	300	1976
Bresmare Inc.	Lot #7, Furnace St.	300	1976
Bresmare Inc.	Lot #14, Gotham Hill Rd.	300	1976
Thomas Rego	Lot #7, Seaflower Lane	300	1976
Bresmare Inc.	Lot #7, Furnace St.	300	1976
Bresmare Inc.	Lot #14, Gotham Hill Rd.	300	1976
Thomas Rego	Lot #7, Seaflower Ln.	300	1976
Bresmare Inc.	Lot #34, King Phillip Path	300	1976
Bill Ritchie	Lot #1, Moraine St.	300	1976
George Cole	84 Bartlett Island Way	1,000	1976
Dana Ohala	off Summer St., Lot #4	1,000	1976
Timothy Coffey	Jefferson Ave.	1,000	1976
Richard Wiley	Bartlett Island	2,000	1976
Barkwood Realty Trust	Bartlett Is. Rd., Lot 12	1,000	1975
Pilgrim Colony Homes	Flames Rd., Lot #13	300	1975
John Banks	S. River St.	300	1975
William Ritchie	Morraine St., Lot #2	300	1975
James Jordan	Outlook Rd.	330	1975
Bresmarc Inc.	Furnace St., Lot #5	300	1975
James Bartling	Carpenter Lane, Lot #5	275	1975
John Matti	School St., Lot #2	300	1975

NAME	ADDRESS	CAPACITY OF TANK	DATE INSTALLED
Mary Tangney	175 Summit	275	1975
Atlantic Venture Corp.	Outlook Rd., Lot #151	300	1975
Patrick Brady	N. River Drive, Lot #2	1,000	1975
Alfred DeCastro	Furnace St., Lot #1	300	1975
Richard Wiley	Bartlett's Island Rd.	2,000	1975
Thomas McCormack	Summit Rd., Lot #177	1,000	1975
McSharry Bros.	Peterson Path Lot #212	300	1975
Atlantic Venture	Outlook Rd., Lot # 149	300	1975
Atlantic Venture	Summit Rd., Lot #187	300	1975
Country Shore Homes	Ladyslipper Ln., Lot #12	300	1975
Lawrence Kay	Flames Rd.	1,000	1975
Bresmarc Inc.	Furnace St., Lot 6	300	1975
Robert Junior	Pine St., Lot 13	300	1975
Robert Junior	Forest St., Lot #1	300	1975
Robert Junior	Forest St., Lot #4	300	1975
Tom Calcagni	Salt Meadow, Lot #14	300	1975
Joseph D'Acostino	545 Plain St.	1,000	1975
Peter Rinando	Kearsaige Rd.	1,000	1975
John Clough	Cornwell Hill, Lot #2	1,000	1975
Steve Whorisky	Outlook Rd. Lot #141	275	1975
Steve Whorisky	Outlook Rd., Lot #139	275	1975
Robert Kelly	?	200	1975
Robdor Realty Trust	Pine Street, Lot #15	300	1975
Robdor Realty Trust	Pine Street, Lot #14	300	1975
Atlantic Venture	Pilgrim Trail, Lot #155	300	1975
Pilgrim Colony Homes	Maryland St., Lot M-1	300	1975
William Chase	Moraine St., Lot 2	300	1975
William Chase	Moraine St., Lot 3	300	1975
Atlantic Venture	Outlook Rd., Lot 153	300	1975
Gordon Kennedy	40 New St.	275	1975
Construction Corp. of Milton	1801 Ocean St.	2,000	1975
Michael Brennan	61 Brook	2,000	1975
Jason Realty Trust	Lot A, Ferry St.	300	1973
John Roderick	Valley Path Rd.	300	1973
Thomas Calcagni	Lot 521, Wellington Ave.	300	1973
Mr. Gerry Cathcart	24 Plainfield Rd.	1,000	1973
Castle Green Bldrs.	Apt. 7, School St.	300	1973
Thomas Calcagni	Lot #29, Ferry St.	300	1973
John Paiva	Old Main St.	300	1973
Philip Larkin	35 Carolina Tr.	500	1973

NAME	ADDRESS	CAPACITY OF TANK	DATE INSTALLED
John Mattie	Lot #5, School St.	300	1973
Marshfield Real Estate	Lot #1, School St.	300	1973
Castle Green Apts.	Bldg. #2, School St.	300	1973
Marshfield Real Estate	Lot #3, School St.	300	1973
Marshfield Real Estate	Lot #3, School St.	300	1973
	Lot #2, School St.	300	1973
Somnino Gentile	44 Winslow St.	275	1973
Castle Green Apt.	Bldg. #12, School St.	300	1973
Virgil Iontosla	Norwell Ave.	300	1973
Castle Green Apt.	Bldg. #7, School St.	300	1973
Castle Green Apt.	Bldg. #6, School St.	300	1973
Plain St. Self Service Laundry	752 Plain St.	2,000	1973
Castle Green Apt.	#8 School St.	300	1973
Castle Green Apt.	#1 School St.	300	1973
Castle Green Apt.	#5 School St.	300	1973
Marshfield Real Estate	Lot #4, School St.	300	1973
Charles Noble	Lot #7, Pinehurst Rd.	1,000	1973
John Mattie	Lot #6, School St.	300	1973
Jason Realty	Lot #C, Ferry St.	2,000	1973
Bresmar	Lot #49, Carolina Ave.	300	1973
Daryl Smith	Buttonwood Ln.	300	1973
Castle Green Bldrs.	Apt. 6, School St.	300	1973
George Nerger Co.	Pilgrim Rd.	300	1973
Ronald Palmer	2103 Ocean St.	1,050	1973
Dr. Luke Tedeschi	28 Raleigh Rd.	300	1973
Spencer A. Joseph	Lot #4, Heatherhill Dr.		
1,000	1973		
Mr. John Spurr	Riverside Circle	2,000	1973
Spencer Joseph	Lot #9, Heather Hill Dr.	330	1973
Spencer Joseph	Lot #6, Heather Hill Dr.	330	1973
Spencer Joseph	Lot #8, Heather Hill Dr.	330	1973
John Mattie	Lot #7, School St.	300	1973
Dennis Monahan	Ferry St.	300	1973
Castle Green Apts.	Bldg. #3, School St.	300	1973
Castle Green Apts.	Bldg. #9, School St.	300	1973
Michael Ennis	Bernard St.	500	1973
Mrs. Daniel Lewis	Damons Pt. Rd.	2,000	1973
Richard Maurano	Indian Rd.	300	1972
Robert Campbell	Charleston St.	300	1972
William Raymond	154 Prospect	300	1972
Paul Christianson	Carolina Tr., Lot #53	300	1972
Thomas Reis	Carolina Tr., Lot #53	300	1972

NAME	ADDRESS	CAPACITY OF TANK	DATE INSTALLED
John Mattie	Parsons Walk, Lot #1	300	1972
Country Shore Homes	Blanchard Dr., House	1,000	1972
Country Shore Homes	Blanchard Dr., Lot B	300	1972
Bresmark, Inc.	Tracey Path, Lot #24	300	1972
Fred Robicheau	1717 Ocean St.	275	1972
Fred Carlson	672 Forrest	500	1972
Clifton Thayer	555 S. River St.	300	1972
Alphonse L'Itanlian	Oakley Dr., Lot #5	300	1972
Harold Jones	128 Barouche Dr.	300	1972
Robert Shapiro	11 Essex Ave.	300	1972
Country Shore Homes	Blanchard Dr., House #4	300	1972
Marshfield B.P.	969 Ocean St.	500	1972
Olav N. Cook	109 Oakleaf Dr.	510	1972
John Roderick	Valley Path Rd.	300	1972
Country Shore Homes	Forest St.	300	1972
Daniel Kerivan	14 Chanaral Center	1,000	1971
Donald Valente	884 Main St.	1,000	1971
South River Realty	Webster St.	1,000	1971
Frank Lapere	Kent Ave & Circuit Ave	500	1971
Richard Simmons	Lot #28, Earldor Circle	500	1971
Charles Pillsbury	Lot #100 Oak Leaf Drive	300	1971
Shoreline Bldrs. Apts.	Parsonage St.	1,000	1971
Robert Pope	179 Old Main St.	275	1971
Michael Corrao	California St.	500	1971
John McDormond	301 Moraine St.	?	?
Marshfield Drive In Cleaners	668 Plain St.	1,000	?
Richard Flicker	5 Atina Way	300	?
St. Ann's by the Sea	591 Ocean St.	2,500	?
Mrs. Shirley Camelio	520 Ferry St.	2,000	?
Thomas Teuten	24 Bow St.	500	?
Martinson Middle School	?	?	?
Stanley Milton	75 Riverside Circle	275	?
George Linton	76 Prospect St.	1,000	?
?	85 Cornwell Hill	?	?
?	22 Summer St.	1,000	?

3. Road Salt

a. Potential Impacts. Deicing chemicals, such as sodium chloride applied to roads in winter or stored in uncovered piles, can wash off pavements into surface water bodies or percolate through soils to groundwaters. Since standard water treatment systems are unable to remove sodium from drinking water, sodium concentrations which may be harmful to the health of some individuals may result. Also, at high concentrations, sodium can corrode water distribution pipes and water fixtures. Therefore, the Massachusetts Department of Environmental Quality Engineering has set a health standard of 20 mg/1 for sodium. DEQE requires regular sampling and analysis of sodium concentrations in public water supplies and notification of customers if the concentrations exceed the standard.

b. Land Use Associations. Land uses which are associated with use of road salts are transportation, for maintaining road safety in the winter, and residential, institutional, commercial and industrial, for clearing parking lots and private drives.

c. Existing Conditions. Road salt used by the town of Marshfield is stored under cover within the water supply watershed area. The sand to salt mixture used by the town is 30:6 tons. This past winter approximately 2,000 tons of salt were spread on town maintained streets. Marshfield protects two areas in close proximity to three municipal wells with no salt zones (approximately 3 miles).

The State DPW maintains Routes 3A and 139, approximately 17 miles of highway. The state applies 100 percent salt to all routes, at a rate of 300 pounds per lane mile.

4. Leachate

a. Potential Impacts. Leachate is liquid waste which results when water percolates through buried materials in sanitary landfills, waste impoundments, and other disposal sites. Depending on the characteristics of the buried materials, leachate can contain inorganic and organic contaminants, as well as dissolved solids which can degrade groundwater supplies.

b. Land Use Associations. Land uses which may be associated with leachate generation area classified as waste, industrial and commercial. Waste uses include sanitary landfills and other official dump sites.

c. Existing Conditions. Marshfield has two active landfills: Marshfield Municipal (public) and Sylvester Ray (private) (Tables 4-9 and 4-10). Both landfills are located near Clay Pit Road, with a proposed addition to Sylvester Ray in the same area. The Board of Health Regulations for the municipal landfill are: prohibition of toxic wastes, waste oils, septic tank and cesspool contents and hazardous materials. Sylvester Ray is restricted to the dumping of demolition materials into the center with a final cover to be placed at the northern end. Presenetly, 1/3 of the site has been covered and seeded.

Table 4-9
MARSHFIELD MUNICIPAL LANDFILL CHEMICAL ANALYSIS
GROUNDWATER SAMPLE LOCATION

	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
	(test results in mg/l)					
pH	6.0	6.2	6.0	5.2	5.6	5.5
Alkalinity (CaCO3)	70	710	500	14	13	58
Specific Conductance	195	1,375	800	1,000	130	325
Chemical Oxygen Demand	BDL (2)	74.9	247	BDL (2)	BDL	BDL
Ammonia (N)	1.90	39.1	3.89	0.18	0.18	0.30
Iron (Fe)	17.6	85.0	182	0.36	0.14	0.14
Lead (Pb)	BDL	0.017	BDL	0.042	BDL	BDL
	concentrations in ppb					
Benzene		2.7				
Toluene			11			
Chlorobenzene		8.6				
1,4 - Trichloroethane						6.0

Table 4-10
SYLVESTER RAY LANDFILL (private)
GROUNDWATER SAMPLING

DATE	SITE		
	Test Well #1	Tetrachloroethylene	10 ppb
	Soil Sample Well #4	Tetrachloroethylene	.6 ppb
1-31-86	Test Well #4	Oil and Grease	8.3 ppb
1-31-86	Test Well #4	Tetrachlorethylene	7 ppb
3-7-86	Test Well #4	Tetrachlorethylene	trace
4-3-86	Test Well #4	1,1,1 - Trichloroethane	trace
4-3-86	Test Well #4	Oil and Grease	6.2 ppb

5. Hazardous Wastes

a. Potential Impacts. Hazardous wastes are wastes which are toxic, reactive, corrosive or ignitable. Improper handling of hazardous wastes is an obvious threat to drinking waters; however, federal and state regulations have been enacted to reduce the threat to of contamination, including water supply contamination. A less obvious source of hazardous wastes is what is commonly referred to as "household hazardous wastes". These include materials such as bleach, mothballs, paint remover, oven cleaner, wood preservative, and used motor oil. Improperly disposed of they also can reach groundwater or surface water and result in contamination of supplies. This is especially true in an unsewered area, such as Marshfield's water supply watershed. All materials disposed of "down the drain" will reach the groundwater through on-lot septic systems, which are not designed to treat many chemical wastes.

b. Land Use Associations. All developed land use types have the potential to be associated with hazardous wastes. 32 percent of Marshfield is developed. In addition transportation corridors are susceptible to accidental spills.

c. Existing Conditions. There are seven hazardous waste handlers on DEQE's Inventory (Table 4-11). Three of the seven are hazardous waste generators; these include two cleaning operations and a floor coating company. Six out of seven businesses are in or in close proximity to the aquifer and or municipal wells. In addition, the regulatory list may not be entirely comprehensive and may overload smaller businesses who could be handling detrimental materials as well.

6. Pesticides

a. Potential Impacts. The term pesticides includes insecticides, fungicides, herbicides and rodenticides. These are all chemical compounds used to control unwanted organisms such as insects, weeds and rodents. Since the compounds vary depending upon their target organisms, their potential water resources effects also vary greatly. Pesticides may enter water supplies by direct infiltration through the ground or by way of runoff. Water supply impact may be caused by improper use, storage, or disposal of pesticide products. In some locations, even properly regulated application may have the potential to impact water supplies.

b. Land Use Associations. Land uses associated with use of pesticides are residential, institutional, transportation, utility (electrical) agricultural and recreation. Homeowners use pesticides to control insects, weeds and rodents in gardens and homes. Municipal departments of public works often use herbicides for part of road maintenance. Golf courses often use herbicides and fungicides to maintain the turf.

Utility companies use selective herbicide applications to eliminate tall-growing trees which interfere with the function of the utility lines. The general amount of herbicide used for this is less than one gallon per acre.

The intent of railroad herbicide applications is to control all vegetation along the track since it may cause instability or lead to fires. The area usually treated is about 12 feet to either side of the center of the track, known as the railroad layout or ballast area. A number of chemicals are used together which generally amount to 5 to 8 gallons of herbicide per acre.

Organic pesticides may be used directly in lakes and reservoirs for control of aquatic insects. Other methods of their reaching water bodies are accidental drift from equipment cleanup after application.

c. Existing Conditions. There is only a small amount of active agricultural land. Consequently, the greatest risk of contamination would be from residences and utility rights of way.

7. Mining

a. Characteristics and Water Supply Impacts. Mining poses a threat to groundwater if the excavation reaches too close to the water table, not leaving a sufficient buffer zone for contaminants to be filtered out. Future land uses on abandoned mines should also be carefully regulated, considering the potential groundwater impacts.

b. Land Use Associations. Mining; sand and gravel excavation.

c. Existing Conditions. The town of Marshfield has 256 acres of mined lands. Most of this is located near Clay Pit Road. In the past Marshfield did not have restrictions on depth above water table for earth removal. Consequently, locating two landfills and road salt storage near this mined area may encourage leaching of possible contaminants.

Table 4-11
Marshfield Hazardous Waste Handlers
Listed Under RCA

Name	Address	Activity Type[1]	Regulatory Status[2]
Antons Cleaners	668 Plain Rte. 139	G	2
Cabinets by Sunny	586 Pine St.		1
N. E. Industrial Floor Coating	121 Idyl Wilde	G	
Paul McGuire Chevrolet Inc.	923 Plain Street		2
Plaza Cleaners	933R Webster Street	G	2
Sampsons Auto Body	903 Plain		2
Schulders, William J.	56 Napier Rd.		1

[1]Activity Type: G = Generator

[2]Regulatory Status: 1 Non-regulated (non-handler)
2 Non-regulated (Small Quantity)

Chapter 5

ZONING AND REGULATION OF LAND USE

The preceding chapter focused on land uses which have potential impacts on water supplies. In this chapter existing local, state, and federal laws and regulations which control those land uses will be summarized. The town's zoning bylaw will also be examined in order to determine the potential impacts of future development, and its compatibility with water supply protection. This regulatory analysis will form the basis of the recommendations made in the next chapter.

EXISTING REGULATIONS

A host of local, state, and federal laws and regulations currently exist which regulate the land uses identified above as having potential water quality impacts. These laws and regulations are summarized in Figure 5-1 and described below.

Underground Fuel Storage

- Federal. EPA is developing new requirements which will set minimum standards for State regulations.

- State. The Board of Fire Prevention Regulations has issued new regulations which require (527 CMR 9.00):

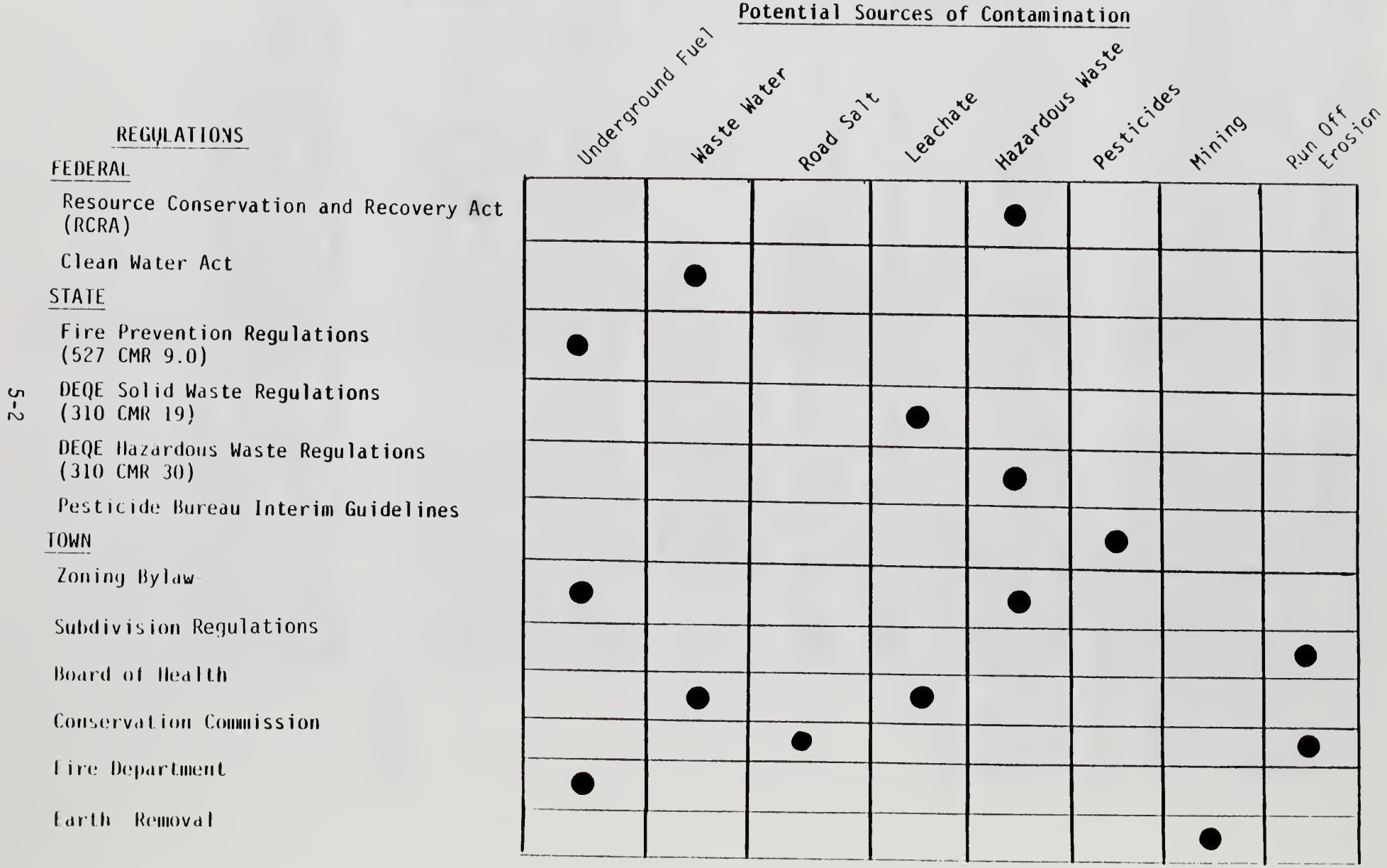
    - tank registration
    - inventory control
    - non-corrosive tanks
    - periodic tank testing
    - removal of abandoned tanks

- Local. The Board of Selectmen issues licenses for gasoline storage over 165 gallons and fuel oil storage over 10,000 gallons. The Fire Department issues permits for fuel oil storage less than 10,000 gallons. Any persons or business requesting a license or permit is required to build a reinforced concrete tank lined with fiberglass or an approved epoxy paint and approved waterproofing on the outside of the tank. An observation pipe must be provided for inspection purposes, as well as two observation wells outside the tank.

Wastewater

- Federal. Industrial wastewater discharges are regulated by The Clean Water Act, which sets stsandards for discharges through The National Pollution Discharge Elimination System (NPDES) Permit Program. (The NPDES) program is implemented jointly by the EPA and The State DEQE. The State has applied for delegation authority.) There are no NPDES permits in the aquifer area in Marshfield.

Figure 5-1
Potential Impacts and Management Techniques



- State/Local. Disposal of sanitary wastewater is regulated by the Board of Health under the State Environmental Code (title 5) and the town's Board of Health regulations on septic systems. The regulations set requirements for the siting and construction of on-site septic systems (Figure 5-2). Marshfield has adopted several measures which are more stringent than the state minimum standards. These include percolation rate, leaching area requirements, and setback requirements.

- Equally important to maintaining water quality is the proper operation and maintenance of septic systems. Periodic inspection is necessary, and the septic tank must be pumped out when greases and solids accumulate.

Road Salt

Marshfield has several salt free zones designated to protect well areas. Only sand may be spread on these locations:

Old Ocean Street
Mount Skirgo Street
Old Mount Skirgo Street
Parsonage Street (from Webster Street to Ocean Street)
School Street (from Forest Street to Old Main Street Extension)
Old Main Street Extension
Forest Street (Furnace Street to School Street)
Proctor Street

In addition, Furnace Street between Forest and Ferry streets has a limited salt use of approximately 8 parts sand to 1 part salt.

Figure 5-2

MARSHFIELD HEALTH REGULATIONS

Regulation	Marshfield	State Board of Health	Title 5
Minimum percolation rate (minutes per inch)		20	30
Plan requirements (feet):		300	200
water supply sources			
watercourses		200	100
Leaching Area Requirements (square feet per gallon):			
Bottom Area			
2.0 min./inch		1.5	1.0
4.0 min./inch		1.8	1.2
6.0 min./inch		2.1	1.4
8.0 min./inch		2.4	1.6
10.0 min./inch		2.7	1.8
15.0 min./inch		3.45	2.3
20.0 min./inch		4.5	3.0
Sidewall Area			
2.0 min./inch		0.6	0.4
4.0 min./inch		0.75	0.5
6.0 min./inch		0.9	0.6
8.0 min./inch		1.2	0.8
10.0 min./inch		1.5	1.0
15.0 min./inch		2.25	1.5
20.0 min./inch		3.0	2.0
Setback Requirements			
Distance (feet) from Leaching field to:			
Well or suction line		200	100
Property line		20	10
Surface water supplies		200	100
Watercourses, swamps, etc.		75	50
Distance (feet) from Septic tank to:			
Surface water supplies		200	50
Watercourses, swamps, etc.		75	25

Figure 5-2 (continued)

Regulation	Marshfield	State
Minimum Leaching Areas (sq.ft.)		
Leaching pits	600	-
Leaching beds	1000	-
Leaching trenching	800	-

Other Marshfield Regulations:

Volume of sanitary sewage: minimum 400 gallons per day for residences (110 gallons per day per bedroom);

Maximum groundwater level to be determined during wettest season of year, or allowance made for seasonal high water level;

Where percolation rate varies among tests, the worst results shall be used;

Percolation tests in fill: soil must be compacted or allowed to settle for six months (Title 5: 12 months);

All disposal systems must be on same lot as the facility producing the sewage;

Percolation test of leaching pits must be at exact location of pit (Title 5-proximity of pit).

Leachate

- Federal. No regulations concerning sanitary landfills.

- State. Landfills are operated under the DEQE regulations (310 CMR 19.000). These cover site selection, construction, cover material, litter and dust control, drainage of surface water, completion and final cover of the landfill.

- New state regulations have been drafted which afford much great protection to groundwater. The new regulations require an impervious liner, groundwater monitoring, runoff guidance, landfill capping. Although not formally adopted as state regulations, DEQE has been applying the standards of the new regulations to most new or expanded landfills.

- Local. The Board of Health has responsibility for assigning sites for sanitary landfills and transfer stations. The Board also has general powers (under Chapter 111) to protect the public health. Marshfield maintains monitoring wells which surround landfills.

Hazardous Waste

- Federal. Hazardous waste generation, treatment, storage, transportation and disposal are regulated by the Resource Conservation and Recovery Act (RCRA). The EPA has delegated authority to the state of Massachusetts to carry out the program.

- State. The Massachusetts Hazardous Waste Management Act (Chapter 21C) and the DEQE hazardous waste regulations (310 CMR 30) establish a system of stringent control over hazardous waste. All waste generators are registered, and all wastes produced accounted for in a "cradle-to-grave" manifest system. All must be handled by licensed haulers and disposal facilities of hazardous wastes. Waste generators are classified as Large Quantity Generators if they generate over 1,000 kilograms per month of non-acutely hazardous wastes. Quantities of waste above the Large Quantity threshold must be removed from the site within 90 days.

Pesticides

- Federal. The EPA tests pesticide products and approves their use, with label instructions for proper use.

- State. Guidelines for right-of-way maintenance are being developed by the Pesticide Bureau of the Department of Food and Agriculture. Two sets of interim guidelines have been issued governing herbicide application. One regulates herbicide use on ballast areas of railroad layouts, and the other addresses herbicide use on both railroad and utility rights-of-way. Both sets of guidelines restrict applications of pesticides to within 400 feet of wells or surface water supplies, including tributary streams. Krenite is to be used between 50 and 400 feet of a water supply source. A 100 foot buffer is to be left on either side of a railroad ballast where it crosses a stream tributary to a surface water supply.

- o Local. There are no town bylaws or regulations concerning application of pesticides.

Mining. (Sand and Gravel excavation)

- o Federal/State. There are no state or federal regulations governing sand and gravel excavation.

- o Local. Article 20 of Marshfield's General Bylaws includes Earth Removal Regulations. These regulations state that the removal of soil, loam, sand, gravel and any other earth material is prohibited when it is within an inland wetland or coastal wetland district. All activities must comply with the Commonwealth of Massachusetts Water pollution regulations. Earth removal must be conducted with the maintenance of proper drainage, temporarily and permanently. Site plans are reviewed by the Board of Selectmen for approval of earth removal. The Board must find that the activities will not have adverse effects on the water supply. The site plans must provide for safe and adequate water supply and sanitary sewerage. Plans must also include delineation of removal area and depths. In addition, the operation of an existing sand and gravel company may be discontinued if any action adversely affects the water table or the natural or engineered drainage of the town.

ZONING

The proceding chapter focused on existing land uses and their potential impact on water supplies. In this chapter, the town's zoning bylaw will be examined in order to determine the potential impacts of future development in the aquifer area and its compatibility with water supply protection.

Zoning determines the type and intensity of development which may occur within defined districts of the town. As such, it is one of the most important tools at the town's disposal to insure the long term protection of its water supplies. By defining critical water resource areas and restricting future land uses within those areas, the town can insure that incompatible or hazardous land uses do not threaten groundwater quality in the future. Sound management of the land use in the aquifer area will not only protect the public health, it will also help prevent a contamination incident which could cost the town millions of dollars in treatment and clean-up costs.

ZONING DISTRICTS

In Marshfield, the 6505 acre aquifer area falls within portions of eight zoning districts (see Table 5-1). Three of these districts are residential and they cover about 6400 acres or 94 percent of the aquifer. About 226 acres or 3 percent of the aquifer is zoned for business, and 187 acres or 3 percent of the aquifer is zoned industrial. Each of the zoning districts is described below, and shown on Map 4.

BUSINESS

The business districts which are located within the aquifer area fall into three categories, B-1 or business-general, B-2 or business-highway, and B-4 or business-waterfront. Permitted uses which all three districts have in common are churches, schools, parks and conservation areas, town buildings, agriculture, and home occupations. Uses allowed by special permit by each district are public utilities, drainage facilities, transportation services and accessory outside storage.

Uses unique to district B-2 are town equipment garages, retail, automobiles, construction industry, dry cleaning plants, open storage of raw materials and accessory manufacturing. Special permitted uses are arranaged as such; B-1 allows greenhouses, construction industries, dry cleaning plants and accessory manufacturing uses. B-2 will accommodate one-family detached dwellings and automotive repairs. B-4 will allow offices.

INDUSTRIAL

There is only one industrial district located in the town of Marshfield. The uses permitted in this area are churches, schools, parks and conservation areas, town buildings, town equipment garages, agriculture, greenhouses, construction industries, motor freight terminals, accessory outside storage and accessory manufacturing uses. By special permit this district will accommodate public utilities, offices, drainage facilities, manufacturing, transportation serves and open storage of raw materials.

OFFICE PARK

The district designated office park permits the use of churches, schools, parks and conservation areas, agriculture, greenhouses, retail, funeral establishments and offices. By special permit, drainage facilities are allowed.

RESIDENTIAL

The residential districts within the aquifer area include three categories: R-1 (43,560 square foot lots), R-2 (20,000 square foot lots) and R-3 (10,000 square foot lots). In addition to housing, other uses permitted in these districts include churches, schools, parks and conservation areas, town buildings, agriculture and livestock. Uses allowed by special permit include hospitals, public utilities, greenhouses, drainage facilities and home occupations.

Figure 5-3

ZONING

Density Requirements and Area Within Aquifer

Symbol	District	Minimum Lot Area (sq. ft.)	Area in Aquifer (acres)	Percentage of Aquifer Area
R1	Residential Rural	43,560	4,423	68
R2	Residential Suburban	20,000	1,626	25
R3	Residential	10,000	65	1
OP	Office Park	20,000	7	.1
B1	Business General	10,000	39	.6
B2	Business Highway	20,000	150	2.3
B3	Business	5,000	---	
	Waterfront	10,000	3	
I1	Industry	40,000	192	3
A	Airport	20,000	---	
TOTAL			6,505	100

FIGURE 5-4

Zoning Bylaw Use Regulations

Principal Use	R	OP	B-1	B-2	B-4
One family detached dwelling	P	-	-	S	-
Church	P	P	P	P	P
Educational	P	P	P	P	P
Park, conservation area	P	P	P	P	P
Town building	P	-	P	P	P
Hospital	S	-	-	-	-
Town equipment garage		-	-	P	-
Public utility	S	-	S	S	S
Agriculture	P	P	P	P	P
Greenhouse	S	P	S	-	-
Livestock	P	-	-	-	-
Retail	-	P	-	P	-
Automobiles	-	-	-	P	-
Funeral establishment	-	P	P	P	-
Offices	-	P	P	P	S

Key to symbols: P = use permitted S = requires Special Permit
- not permitted

Zoning Bylaw Use Regulations (cont.)

Principal Use	R	OP	B-1	B-2	B-4	I1
Automotive repair	-	-	-	S	-	-
Drainage facilities	S	S	S	S	S	S
Construction industry	-	-	S	P	-	P
Manufacturing	-	-	-	-	-	S
Dry Cleaning plant	-	-	S	P	-	-
Motor Freight terminal	-	-	-	-	-	P
Transportation service	-	-	S	S	S	S
Open storage of raw materials	-	-	-	P	-	S
Home occupation	S	-	P	P	P	P
Accessory repair and storage	-	-	P	-	P	-
Accessory outside storage	-	-	S	S	S	P
Accessory manufacturing use	-	-	S	P	-	P

Chapter 6

FINDINGS AND RECOMMENDATIONS

The previous chapters have examined the potential water quality impacts of existing land uses and of potential future land uses permitted under the current zoning bylaw. Existing laws, bylaws and regulations to control potential sources of contamination were reviewed, and their adequacy for groundwater protection was evaluated. As a result of these analyses, in this chapter new or amended bylaws and regulations will be recommended to strengthen the town's protection of its groundwater resources. These recommendations can be drawn together into a comprehensive groundwater protection programs as outlined below.

GROUNDWATER PROTECTION PROGRAM

AQUIFER MAPPING

Findings. In previous studies, consultants have provided the town with generalized maps of aquifers based upon surficial geology. However, these maps do not delineate the areas of contribution to the town's wells. Such mapping is needed to form the basis of a legally defensible groundwater protection district. The current contamination studies will provide mapping of areas of contribution in the Furnace Brook aquifer based upon the standard DEQE criteria for Zone II. This analysis has also been conducted for the new Union Street well. These studies will cover about half of the town's wells.

Recommendations. The town should conduct additional hydrogeologic studies to determine the areas of contribution to the remaining wells not included in current studies. The data from all the studies should be combined on a single map in order to delineate a groundwater protection district for the town.

ZONING

Findings. Marshfield is fortunate that the vast majority of the aquifer area is zoned for residential uses. However, about 187 acres (3%) of the aquifer are zoned industrial and 213 acres (3%) are zoned business. Further, the zoning analysis has shown that a host of non-residential uses are permitted in districts which are nominally residential.

Recommendations. The zoning bylaw should be amended by adding an Aquifer Protection Overlay District. The boundaries of the district would be defined by the hydrogeologic studies described above.

The Aquifer Protection District would overlay existing zoning districts, adding additional requirements, much as the existing Wetland Protection District does. The requirements include a prohibition of uses such as disposal of solid waste or liquid or leachable wastes, discharge of industrial wastewater on-site, storage of petroleum products underground, storage of road salt, animal feedlots, storage or disposal of hazardous wastes, automobile service and repair shops, and junk and salvage yards. In order to maintain groundwater recharge, no more than 10 percent of any lot may be rendered impervious. A model Aquifer Protection District bylaw is in Appendix A.

EARTH REMOVAL REGULATIONS

Findings. Excavation to a depth of less than ten feet above the water table has potential impacts on groundwater quantity and quality. Excavation too close tot he water table can also place constraints on developing the site for other uses after mining activities have ended. In effect, high water table conditions can be created artificially under these circumstances, making site reclamation difficult. The Marshfield bylaw includes Earth Removal Regulations which state that the depth of excavation may be specified as a permit condition, but no standards for excavation depth are included.

Recommendations. The Earth Removal bylaw should be amended to require that the maximum depth of excavation be at least ten (10) feet above the seasonal high water table. The water table elevation should be determined on site by soil borings and test wells which are monitored through at least one high water season, from December to April. An amendment is included in Appendix A.

UNDERGROUND FUEL STORAGE REGULATIONS

Findings. State fire Prevention Regulations require registration of all commercial underground fuel tanks and periodic leak testing (527 CMR 9.00). However, residential tanks less than 1100 gallons are exempted from these requirements. These are typically unprotected steel tanks, many of which are quite old. In Marshfield there are at least 165 of these tanks.

Recommendations. The town should adopt a general bylaw regulating underground fuel storage. The bylaw should require registration of all existing and new underground fuel tanks, regardless of size. The installation of new underground tanks for residential use should be prohibited. An underground fuel bylaw is included in Appendix A.

HAZARDOUS MATERIALS BYLAW

Findings. Improper storage, use or disposal of hazardous materials, even in relatively small quantities, may pose a threat of groundwater contamination. Numerous businesses and industries, small and large, handle materials which may be hazardous. Within the aquifer study area, 400 acres are zoned for business and industrial uses, and 100 acres are already developed with such uses. Even if the zoning bylaw is amended as recommended, all existing uses would be grandfathered.

Recommendations. The town should adopt a general bylaw regulating hazardous materials. The bylaw would:

- require the registration with the Board of Health of hazardous materials used by businesses and industries;
- require the preparation of Emergency Contingency Plans and the designation of Emergency Coordinators;
- require employee training programs in the proper handling of hazardous materials;

- require periodic tank testing;
- prohibit certain hazardous activities within 1000 feet of a municipal well;

A model Hazardous Materials bylaw is included in Appendix A.

SUBDIVISON REGULATIONS

Findings. The town's subdivision regulations contain provisions for the regulation of surface drainage and runoff, but there are no provisions which directly take groundwater into consideration.

Recommendations. The Planning Board should amend the subdivision regulations by adding a provision which allows the Board to require information on groundwater resources, impacts, and mitigation measures. This provision would be optional and applied in appropriate cases at the discretion of the Planning Board. It should allow the Board to require such information as water table elevations, direction of groundwater flow, nutrient loading, and impacts on aquifers or recharge areas for public water supplies. Mitigation measures to be analyzed may include open and closed drainage systems, oil and grease separators, and detention basins for contaminant removal.

The amendment should allow the Board to require appropriate mitigation measures to protect groundwater quality and quantity.

A subdivision regulation amendment is included in Appendix A.

HOUSEHOLD HAZARDOUS WASTES

Findings. Although the aquifer area is primarily residential in character, there are many household products which pose a potential threat to water quantity if improperly disposed of. These include cleaners, solvents, polishes, paints, lubricants, antifreeze, and motor oil.

Recommendations. The town should conduct household hazardous waste collections on an annual basis, taking advantage of state financial assistance when available. Publicity for the collections should especially focus on the Aquifer Protection District. As part of this effort, there should be a public education campaign to discourage the improper disposal of household hazardous wastes. The town could also investigate the feasibility of operating a waste oil recycling project at the transfer station.

APPENDIX A

BYLAWS AND REGULATIONS

1 Aquifer Protection District

2 Hazardous Materials Bylaw

3 Underground Fuel Bylaw

4 Earth Removal Bylaw amendment

5 Subdivision Regulation amendment

AQUIFER PROTECTION DISTRICT

SECTION I

Definitions

Animal Feedlot: A plot of land on which 25 livestock or more per acre are kept for the purposes of feeding.

Aquifer: Geologic formation composed of rock or sand and gravel that contains significant amounts of potentially recoverable potable water.

Groundwater: All the water found beneath the surface of the ground. In this bylaw the term refers to the slowly moving subsurface water present in aquifers and recharge areas.

Impervious Surface: Material on the ground that does not allow surface water to penetrate into the soil.

Leachable Wastes: Waste materials including solid wastes, sewage, sludge, and agricultural wastes that are capable of releasing water-borne contaminants to the surrounding environment.

Mining of Land: The removal or relocation of geologic materials such as topsoil, sand and gravel, metallic ores, or bedrock.

Recharge Areas: Areas composed of permeable stratified sand and gravel and certain wetlands that collect precipitation or surface water and carry it to aquifers.

Solid Wastes: Useless, unwanted, or discarded solid material with insufficient liquid content to be free flowing. This includes but is not limited to rubbish, garbage, scrap materials, junk, refuse, inert fill material and landscape refuse.

SECTION II

Purpose of District

The purpose of this Aquifer Protection District is:

(A) to promote the health, safety, and general welfare of the community;

(B) to protect, preserve and maintain the existing and potential groundwater supply and groundwater recharge areas within the town;

(C) to preserve and protect present and potential sources of water supply for the public health and safety;

(D) to conserve the natural resources of the town;

(E) to prevent blight and the pollution of the environment.

SECTION III

Scope of Authority

The Aquifer Protection District shall be considered as overlying other zoning districts. No uses not permitted in the portions of the districts so overlaid shall be permitted in this district.

SECTION IV

Establishment and Delineation of Aquifer Protection District

For the purposes of this district, there are hereby established within the town certain aquifer protection areas, consisting of aquifers and/or aquifer recharge areas, which are delineated on a map at a scale of 1 inch to ____ feet entitled "Aquifer Protection Areas, Town of _____" This map is hereby made a part of this district and of the town zoning bylaw and is on file in the Office of the Town Clerk. As delineated on the map, the Aquifer Protection District comprises the following elements:

A. Aquifers, together with:

1. the surface of the land lying above them, and

2. a surrounding protective strip, approximately 250 feet in width.

B. Recharge areas, defined by the extent of permeable stratified sand and gravel and recharging wetlands within them that drain into the aquifer, together with:

1. a surrounding protective strip, approximately 100 feet in width, and

2. the shoreline, to seasonal high water line, of any stream that flows into the recharge area.

Where the bounds are delineated are in doubt or in dispute, the burden of proof shall be upon the owner(s) of the land in question to show where they should properly be located. At the request of the owner(s), the town may engage a professional geologist or soil scientist to determine more accurately the location and extent of an aquifer or recharge area, and may charge the owner(s) for all or part of the cost of the investigation.

SECTION V

Use Regulations

Within the Aquifer Protection District, these regulations shall apply:

A. The following uses are permitted within the Aquifer Protection District, subject to s. 8, provided that all necessary permits, orders, or approvals required by local, state, or federal law are also obtained:

1. conservation of soil, water, plants and wildlife;

2. outdoor recreation, nature study, boating, fishing, and hunting where otherwise legally permitted;

3. foot; bicycle and/or horse paths and bridges;

4. normal operation and maintenance of existing water bodies and dams, splash boards, and other water control, supply and conservation devices;

5. maintenance, repair [and enlargement] of any existing structure provided there is no increase in impermeable pavement;

6. residential development[1], if permitted in the underlying district, provided that no more than 10 percent of a building lot (including the portion of any new street abutting the lot) is rendered impervious.[2]

7. farming, gardening, nursery, conservation, forestry, harvesting and grazing provided that fertilizers, herbicides, pesticides, manure and other leachable materials are not stored outdoors.[3]

[8. Optional: creation of ponds up to one acre in size.]

B. The following uses are prohibited:

1. disposal of solid wastes, other than brush and stumps;

2. storage of petroleum or other refined petroleum product except within buildings which it will heat;

---

[1]The use of pesticides and fertilizers in connection with these activities may be made subject to reasonable regulations (see Ch. 2).

[2]Larger parking areas, if required, must be constructed with permeable paving.

[3]The community may install test wells to monitor for contamination by herbicides, pesticides or fertilizers.

3. the disposal of liquid or leachable wastes, except one- or two-family residential subsurface waste disposal systems;

4. the rendering impervious of more than 10% of any lot;

5. industrial uses which discharge process wastewater on-site;

6. [use or] storage of road salt or other deicing chemicals;

7. dumping of snow containing deicing chemicals which is brought in from outside the district;

8. animal feedlots;

9. the storage of uncovered manure;

10. mining of land except as incidental to a permitted use;

11. the storage or disposal of hazardous wastes, as defined by the Hazardous Waste Regulations promulgated by the Hazardous Waste Board, the Water Resources Commission, and the Division of Water Pollution Control under the provisions of Sections 27(8), 52, 57, and 58 of Chapter 21 of the General Laws.

12. Automotive service and repair shops, junk and salvage yards.

C. The following uses are permitted by Special Permit, subject to the approval of the [Special Permit Authority] under such conditions[4] as they may require and also subject to s. B:

1. the application of pesticides for non-domestic or non-agricultural uses provided that all necessary precautions shall be taken to prevent hazardous concentrations of pesticides in the water and on the land within the Aquifer Protection District as a result of such application. Such precautions include, but are not limited to, erosion control techniques, the control of runoff water (or the use of pesticides having low solubility in water), the prevention of volatilization and redeposition of pesticides and the lateral displacement (i.e. wind drift) of pesticides;[5]

2. the application of fertilizers for non-domestic or non-agricultural uses provided that such application shall be made in such a manner as to minimize adverse impacts on surface and groundwater due to nutrient transport and deposition and sedimentation;

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[4]The SPA should establish regulations under this section to insure against contamination and loss of recharge by such means as water-tight sewer pipes, ban on road salt, erosion control, preservation of ground cover, permeable paving, maintenance of catch basins.

[5]See note on pesticides in the Watershed Protection bylaw in ch. 2.

3. those commercial and industrial activities permitted in the underlying district with a site plan review* to prevent compaction and siltation, loss of recharge, exfiltration for sewer pipes and contamination by oil, chemicals, nutrients, etc.

D. Procedures for Issuance of Special Permit

1. Each application for a special permit shall be filed with the [Special Permit Authority] and shall be accompanied by ___ copies of the plan.

2. Said application and plan shall be prepared in accordance with the data requirements of the proposed development, (e.g., site plan review, erosion and sedimentation control plan, etc.

3. The [SPA] shall refer copies of the application to the Board of Health, Planning Board, the Conservation Commission and Town Engineer/Department of Public Works, which shall review, either jointly or separately, the application and shall submit their recommendations to the [SPA]. Failure to make recommendations within 35 days of the referral of the application shall be deemed lack of opposition.

4. The [SPA] shall hold a hearing, in conformity with the provisions of G.L. ch. 40A, s. 9, within 65 days after the filing of the application and after the review by the town/boards/departments.

Notice of the public hearing shall be given by publication and posting and by first-class mailings to "parties in interest" as defined in G.L. ch. 40A, s. 11. The decision of the [SPA] and any extension, modification or renewal thereof, shall be filed with the [SPA] and Town Clerk within 90 days following the closing of the public hearing. Failure of the special permit granting authority to act within 90 days shall be deemed as a granting of the permit. However, no work shall commence until a certification is recorded as required by said s. 11.

5. After notice and public hearing, and after due consideration of the reports and recommendations of the boards/departments, the [SPA] may grant such a special permit provided that it finds that the proposed use:

(a) is in harmony with the purpose and intent of this bylaw and will promote the purposes of the Aquifer Protection District;

*See MAPC's Growth Management Techniques (April 1973) for a site plan review model.

(b) is appropriate to the natural topography, soils, and other characteristics of the site to be developed;

(c) will not, during construction or thereafter, have an adverse environmental impact on the aquifer or recharge area; and

(d) will not adversely affect an existing or potential water supply.

adopted 4/13/83 Town Meeting

TOWN OF CANTON

HAZARDOUS MATERIALS BY-LAW

SECTION 1: HAZARDOUS MATERIALS

SUBSECTION 1: AUTHORITY

This By-Law is adopted by the Town of Canton under its home-rule powers, its police powers to protect the public health and welfare, and its authorization under Massachusetts General Laws, Chapter 40, Section 21.

SUBSECTION 2: PURPOSE

This By-Law is intended to protect the public health, safety and welfare, and the environment: as well as preserve and maintain the existing and potential groundwater supply, groundwater recharge areas, and surface waters within the Town from contamination with hazardous materials.

SUBSECTION 3: DEFINITIONS

The following definitions shall apply in the interpretation and implementation of this By-Law.

Hazardous Materials means a product or waste or combination of substances which because of quantity, concentration, or physical or chemical, or infectious characteristics may reasonably pose, in the determination of the enforcing authority, a substantial present or potential hazard to the human health, safety, or welfare, or the environment when improperly treated, stored, transported, used or disposed of, or otherwise managed. Any substance which may create a special hazard in the event of a spill, leak, fire, or exposure; and all substances deemed a hazardous waste in Massachusetts General Laws, Chapter 21C shall also be considered a hazardous material for the purpose of the By-Law.

Contingency Plan means a document setting an organized planned, and coordinated course of action to be followed in case of fire, explosion, or release of hazardous materials which could threaten public health, safety, or welfare, or the environment.

Discharge means the disposal, deposit, injection, dumping, spilling, leaking, incineration, or placing of any hazardous material into or on any land or water so that such hazardous material or any constituent thereof may enter the environment

SUBSECTION 3: DEFINITIONS CONTINUED

Materials Safety Data Sheet means the form containing data on physical characteristics, flammability, explosivity, reactivity, and the health and safety hazards of specific chemicals, as well as information relative to procedures recommended for spills and leaks of specific chemicals and special protections and precautions to be taken in the handling of specific chemicals.

Reportable Discharge means all discharge greater than three gallons liquid volume or five pounds dry weight, or any discharge which would potentially threaten the public health and safety or the environment by entering surface water, groundwaters, or water recharge areas, or by emitting toxic fumes or gases into the air. Discharges which are in compliance with all Federal, State, and local regulations, or which are permitted by governing Federal, State, or local agencies are not considered reportable discharges.

SUBSECTION 4: SEVERABILITY

Each provision of this By-Law shall be construed as separate to the end, that if any provision, or sentence, clause or phrase thereof, shall be held invalid for any reason, the remainder of that section and all other sections shall continue in full force and effect.

SUBSECTION 5: HAZARDOUS MATERIALS NOT SUBJECT TO REGULATION BY THIS BY-LAW

The following materials are not within the scope of authority of this By-Law:

(1) Domestic Sewage
(2) Household waste including garbage, trash and septage from single and multiple residences, hotels and motels.
(3) Wastes generated from the growing of agricultural crops and the raising of animals, including manure which are returned to the soil as fertilizer.

SUBSECTION 6: REGISTRATION REQUIREMENTS

Every owner, or operator of a commercial or industrial establishment (including municipal, state, and federal operations) which stores, transports, uses, handles, or otherwise manages hazardous materials (excluding fuel oil stored for the purpose of heating buildings located on site) totaling more than fifty gallons liquid volume or twenty-five pounds dry weight shall register with the Board of Health.

SUBSECTION 6: CONTINUED

Registration includes the following:

(1) Submission of a map or written description locating areas where hazardous materials are stored, handled, or in use, specifying approximate average quantities of materials in each location and the special handling required in a fire, leak, spill or exposure. Areas must also be identified which store emergency equipment including medical supplies, along with a brief description of the capabilities of the equipment.

This map or written description must also be posted in one of the following on site locations: (a) Guard Shack, (b) Fire Alarm Box, (c) Sprinkler Riser, (d) other location acceptable to the Head of the Fire Department. The location of this posting must be specified during registration.

(2) Submission of names, addresses, and telephone numbers of all qualified "Emergency Coordinators" who are individuals identified by owners or operators of commercial or industrial establishments which must register in accordance with this By-Law. "Emergency Coordinators" must be knowledgeable in the types of hazardous materials used at the establishment, proper storage and handling of those materials, familiar with the establishments emergency contingency plan, and authorized as on-site coordinator in the event of an emergency.

(3) Keep on file at all times in an on-site location known and accessible to all "Emergency Coordinators", Materials Safety Data Sheets on all hazardous materials manufactured, stored, or used at the establishment. These Materials Safety Data Sheets must be available to the Board of Health and the Head of the Fire Department during routine inspections, investigations, and in the event of an emergency.

(4) Keep on file at all times in an on-site location known and accessible to all "Emergency Coordinators" an Emergency Contingency Plan which identifies "Emergency Coordinators" and details the area where and ways in which an emergency could come about, the techniques and procedures to be used for prevention and control of such emergencies, the emergency equipment availabl on-site, outside agencies and organizations who should be notifie and/or may provide services in an emergency, an evacuation plan for personnel, and an inventory of the types, approximate quantities, and method of storage, transportation, and disposal of all hazardous materials.

SUBSECTION 6.1 EFFECTIVE DATE OF REGISTRATION REQUIREMENTS

(A) Registration required by Section 6 shall be initially submitted by September 1, 1983 and annually thereafter within thirty days of January 1 each year. Records required in Subsection to be kept on file at each establishment should be updated as frequently as necessary to ensure proper handling of hazardous materials and adequate procedures to minimize emergencies and the damage which would result from such emergencies.

(B) Owners and operators of commercial and industrial establishments who have not previously registered in accordance with Subsection 6 shall, if they meet registration requirements register initially within thirty days of meeting such requirements and thereafter within thirty days of January 1 each year.

SUBSECTION 6.2 UPDATING OF REGISTRATION INFORMATION

All information required under Subsection 6 of this By-Law must be kept current to reflect substantial changes in quantities or types of hazardous materials on-site.

SUBSECTION 7: HAZARDOUS MATERIALS GENERALLY

All hazardous materials within the Town of Canton must be stored, handled, transported and used in such a way as to minimize discharges and to ensure maximum protection of the environment and the public health, safety and welfare.

SUBSECTION 7.1:

All commercial and industrial establishments (including municipal, state, and federal operations) must provide adequate employee training programs to ensure proper use, storage, transportation and handling of hazardous materials.

SUBSECTION 7.2

Owners and operators of establishments registered in accordance with Subsection 6 of this By-Law must keep sufficient records to detect significant loss of hazardous materials and provide best estimates of quantities of hazardous materials on-site.

SUBSECTION 7.3

All locations where hazardous materials are stored or used in quantities that could cause a substantial hazard in the event of a spill, leak, fire, or exposure, shall be designated with legible warning signs of bright yellow, or other equally conspicuous color, indicating the potential danger and how to overcome or avoid such danger.

SUBSECTION 7.4

All hazardous materials shall be held in product tight containers. All containers of hazardous materials which permit leakage or spillage shall be disposed of or repaired to its original product tight state.

SUBSECTION 7.5

Every owner of a commercial or industrial establishment (including municipal, state, or federal operations) shall comply with all Federal, State, and Municipal Laws and Regulations relative to Hazardous Materials.

SUBSECTION 8: ABOVEGROUND STORAGE OF HAZARDOUS MATERIALS

(A) Aboveground containers of hazardous materials shall be kept in an orderly manner, shall be adequately marked to identify the hazard, and shall be stored on a surface impervious to the material being stored. The storage area shall be enclosed by a permanent dike of impermeable construction. The volume of the area enclosed by the dike shall be equal to or greater than the capacity of the containers within the dike.

(B) There shall be no storage of incompatible chemicals (those which react with one another to create a special hazard) in the same area.

(C) Drainage and ventilation of storage areas containing hazardous materials shall be constructed and maintained so as to control spills, fumes, noxious gases and other potential sources of contamination

SUBSECTION 9: UNDERGROUND STORAGE

The following provisions shall apply to all underground liquid hazardous material storage systems.

SUBSECTION 9.1

Owners shall file with the Board of Health the size, type, age(if known), and location of each tank, and the type of hazardous materials stored in each, on or before September 1, 1983.

SUBSECTION 9.2

Owners of tanks for which evidence of installation is not available shall, at the order of the Board of Health, have such tanks tested. If either the Board of Health or the Head of the Fire Department determines that the tank is not product tight

SUBSECTION 9: CONTINUED

it shall be repaired or disposed of under the direction of the Board of Health or the Head of the Fire Department.

SUBSECTION 9.3

All tanks shall be tested the day of installation and thereafter at intervals sufficient to prevent loss of hazardous materials and resulting contamination.

SUBSECTION 9.4

All newly installed tanks subject to this By-law shall be protected from internal and external corrosion and shall be of a design approved by the Board of Health and the Head of the Fire Department.

SUBSECTION 9.5

All leaking tanks must be emptied by the owner or operator within twelve hours of leak detection; and repaired to a product tight condition or removed by the owner or operator in a time period to be determined by the Board of Health.

SUBSECTION 10: EFFECTIVE DATE

All storage provisions contained in Subsections 7, 8 and 9 must be complied with by July 1, 1984.

SUBSECTION 11: REPORTING REQUIREMENTS

Any person having knowledge of a reportable discharge of hazardous material shall immediately report the discharge to the Board of Health, and if involving flammable or explosive materials, to the Head of the Fire Department.

SUBSECTION 12: PROTECTION OF PUBLIC WATER SUPPLIES

In order to protect and preserve existing drinking water sources, the following uses are prohibited within one thousand (1,000) feet of the head of a gravel packed well used as a source of municipal drinking water unless exempted by a variance in accordance with Subsection 14 of this By-Law.

SUBSECTION 12: CONTINUED

A. Automotive service and repair shops, junk and salvage yards, and car washes.

B. Storage of road salts or other deicing chemicals

C. Use of chemicals for deicing unless deemed necessary for public safety.

D. The discharge of hazardous materials.

E. Commercial or industrial uses which require registration in accordance with Subsection 6 of this By-Law.

F. Commercial or industrial uses which discharge process wastewaters on-site, excluding discharges permitted in accordance with all applicable State and Federal regulations which are shown to contain no contaminants.

G. Commercial or industrial uses which re-charge stormwater to groundwater without passage through oil and grease traps and sediment traps, constructed, operated, and maintained to minimize groundwater contamination.

SUBSECTION 13: PERMITS REQUIRED

A. A permit shall be required and obtained from the Board of Health for all new commercial or industrial establishments requiring registration in accordance with Subsection 6.2, prior to the operation of said establishment, to determine that the provisions of this By-Law have been met.

B. A permit shall also be required and obtained from the Board of Health for all establishments requiring registration in accordance with Subsection 6, who seek to install additional aboveground or underground hazardous materials storage tanks.

SUBSECTION 14: VARIANCES

The Board of Health may vary the application of any provision of this By-Law, unless otherwise required by law, in any case when, in its opinion, the applicant has demonstrated that an equivalent degree of environmental protection required under this By-Law will still be achieved. The applicant at his own expense must notify all abutters by certified mail at least ten days before the Board of Health meeting at which the variance request will be considered. The notification shall state the variance sought and the reasons thereof. Any variance granted by the Board of Health shall be in writing. Any denial of a variance shall also be in writing and shall contain a brief statement

REGISTRATION OF UNDERGROUND STORAGE TANKS

Article : Will the Town vote to amend the General Bylaws by adding thereto the following new bylaw:

From and after December 1, 1988, any person who owns, leases, or otherwise controls any parcel of land within the town of Marshfield wherein an underground storage tank or container has been or will be installed shall register such tank or container with the Marshfield Fire Chief.

As part of the registration process such person shall furnish to the Marshfield Fire Chief evidence, deemed sufficient by him, to establish the date of installation of said tank or container. If such evidence is not furnished the tank or container shall be conclusively presumed to have been installed twenty years prior to the effective date of this bylaw. Tanks which are not registered as provided herein shall be tested immediately upon discovery at the owner's expense. Testing will consist of a five pounds per square inch air pressure test and shall be performed on an empty tank along with any other appropriate test approved in advance by the Fire Chief.

SMALL UNDERGROUND STORAGE TANKS

ARTICLE : Will the Town vote to amend the General Bylaws by adding thereto the following new bylaw:

> Notwithstanding any other provision of these General Bylaws, the installation of any underground tank or other container having a capacity of 1100 gallons or less, except tanks or containers designed and intended solely for the storage of water, is prohibited within the town of Marshfield.
>
> The Marshfield Board of Selectmen may vary the application of this bylaw in any case where, in its opinion the applicant has demonstrated a clear and convincing hardship and has presented a plan for installing such tank which complies with the provisions of General Bylaw No. 56, relating to the construction of underground storage tanks.
>
> Before granting any variance hereunder, the Marshfield Board of Selectmen shall hold a public hearing, said hearing to be advertised by publication in a newspaper of general circulation in the Town of Marshfield at least seven days before it is held. Any variance shall be in writing and shall contain a brief statement of the reasons therefor. Any denial of an application for variance shall also be in writing and shall contain a brief statement of the reasons for denial.

EARTH REMOVAL BYLAW AMENDMENT

ARTICLE : Will the Town vote to amend Article 20 of the General Bylaws relating to Earth Removal as follows:

By adding to paragraph 4 of said Bylaw the following new subparagraphs:

j. No permit shall be issued or renewed under this Bylaw until the applicant has submitted to the Board current and complete information on the actual and proposed depth of excavation and the maximum groundwater elevation throughout the entire area proposed to be excavated. Maximum groundwater elevation shall be determined by means of monitoring wells, test pits and soil borings during the months of March, April or May. Such tests shall be conducted by a Massachusetts Registered Professional Engineer at the expense of the applicant and shall be observed by a representative of the Board. Test results shall be submitted to the Board over the engineer's stamp.

The groundwater monitoring wells shall be left in place during the period that the applicant holds a permit hereunder, and readings therefrom shall be taken during March, April or May of each year. The results of such readings shall be submitted to the Board over the engineer's stamp.

Excavation shall be restricted to those areas which are at elevations ten feet or more above the maximum groundwater elevation as determined by the most recent testing conducted under the provisions of this subparagraph.

n. The Board of Selectmen may require the person holding a permit hereunder to provide it with documentary evidence of the quantities of material excavated, the date of removal of such material and the owner of the vehicle used to transport the material.

and by deleting subparagraph 9c of said Bylaw and substituting therefor the following new subparagraph 9c:

In addition to the penalties provided for in subparagraphs (a) and (b) above, the violation of any provision of this Bylaw or any condition of a permit issued hereunder may, at the discretion of the Board, be punishable by the immediate revocation of the permit. No permit shall be revoked until the holder thereof has been given notice and an opportunity to be heard by the Board.

SUBDIVISION REGULATION AMENDMENTS

Procedure for the Submission and Approval of Plans

Grading Plan

The Board may require that the following be submitted where such information is necessary to evaluate the plan because of special circumstances of the proposal or its location including, but not limited to, proximity to aquifers, groundwater recharge areas, or public water supply wells:

a. location of aquifers or recharge areas for existing or potential drinking water supplies.

b. Analysis of open and closed drainage system alternatives, examining effects upon the recharge of aquifers and the quality of the groundwater.

c. Maximum groundwater table elevation and direction of groundwater flow.

Required Improvements

Improvement Specifications

Storm and Surface Drainage

The Board may require that the following measures be taken because of special circumstances of the proposal or its location including, but not limited to, proximity to aquifers, groundwater recharge areas, or public water supply wells:

(1) Design and construction shall reduce, to the extent possible, the following:

- dimensions of paved areas
- encroachment within any wetland or floodplain
- volume of cut and fill
- area over which vegetation will be distributed
- extent of waterways altered or relocated

(2) Pollution control devices, including provisions for contaminant removal employing detention basins with subsurface drains or perforated risers, oil and grit separator catch basins, and other appropriate devices.

APPENDIX B

Addendum on Hazardous Materials Bylaw

TOWN OF MARSHFIELD

870 MORAINE STREET
MARSHFIELD, MASSACHUSETTS 02050
617-837-5141

September 24, 1987

TO: Members of the Marshfield Groundwater Study Committee

FROM: Marguerite M. Morris, Member of Committee
Chairman Board of Health

RE: Hazardous Materials By-Law Proposal

The following is submitted for your consideration as an addendum to the Final Report to be forwarded to the Board of Selectmen.
Before the Town, in the persons of the Board of Health, Selectmen or any other board, moves forward with the proposed Hazardous Materials By-Law the following procedures/investigation should occur:
1) The stated goal of protecting our groundwater supply/sources needs the objectives studied/defined further;
2) The goal may better be achieved by incorporating existing and proposed state statutes into (by direct reference) existing town permit procedures. This may require an investigation by Town Counsel into the state statutes so that a clear line of jurisdiction is established;

For example only at this time I suggest that:
1) The Board of Appeals could formally incorporate into their rules and regulations for Site Plans, Variances and Special Permits that Materials Safety Data Sheets and their management plans such as required or to be required by DEQE be part of an application. This type of consistency of procedures can prevent loopholes and avoid duplication of efforts;
2) The Board of Selectmen could propose a General By-Law that also incorporates the same DEQE regulations including those proposed for Small Quantity Generators and further require all existing businesses to file their plans with the town through the Selectmen's Office. The Town Clerk's Office could supply the names all existing businesses.
3) From the above two items all Emergency COntingency Plans would be forwarded to the Fire Department for monitoring. Since that Department functions 24 hours a day, there would insurance of an immediate response.
4) Before the issuance of any annual license from the Town a written statement could be required that the applicant has conformed to the above.

While the previous items are only initial ideas I believe it highlights the need for additional investigation before we implement any new programs. We can find a way to incorporate the goal into existing permits without the need for an additional permitting authority.

However, one of the areas to be considered will be the costs of implementation.

The Advisory Board should be brought into the discussion as soon as possible so that staff, time and other financial resources are adequately provided; without the financial resources, the goal may not be achieved.

Margaret B. Harris

APPENDIX C

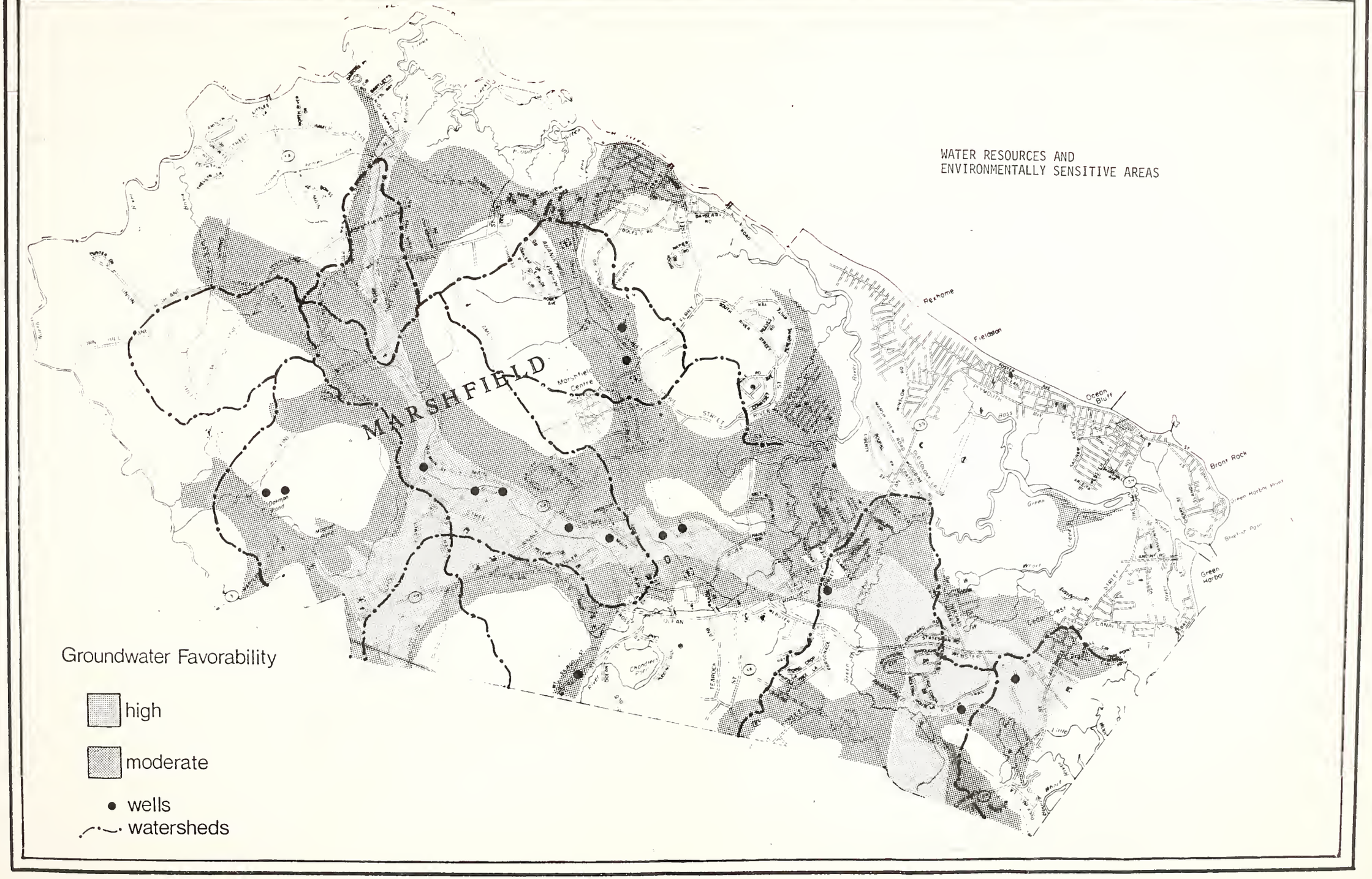
MAPS

1 Water Resources and Environmentally Sensitive Areas

2 Land Use

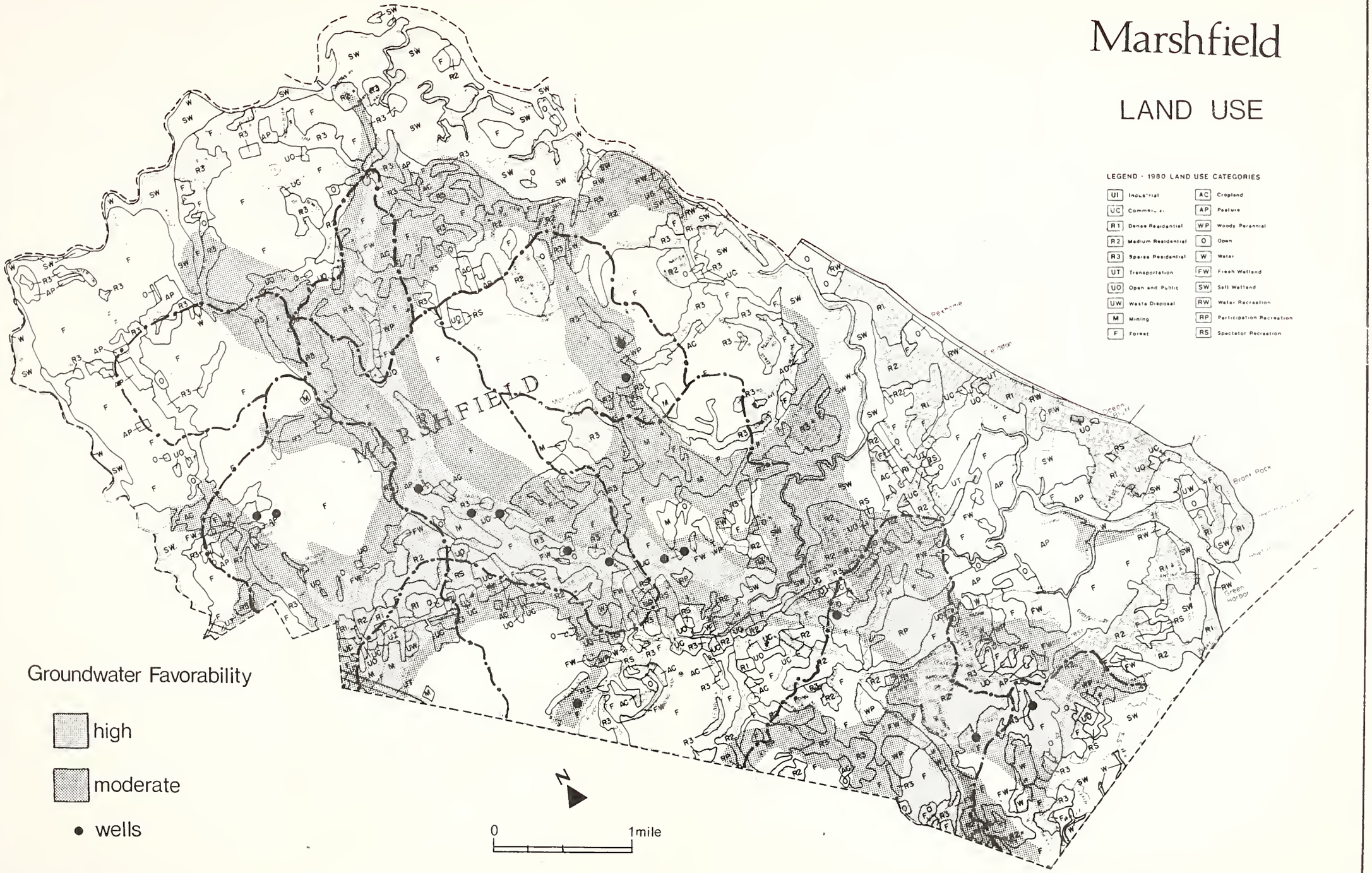
3 Potential Sources of Contamination

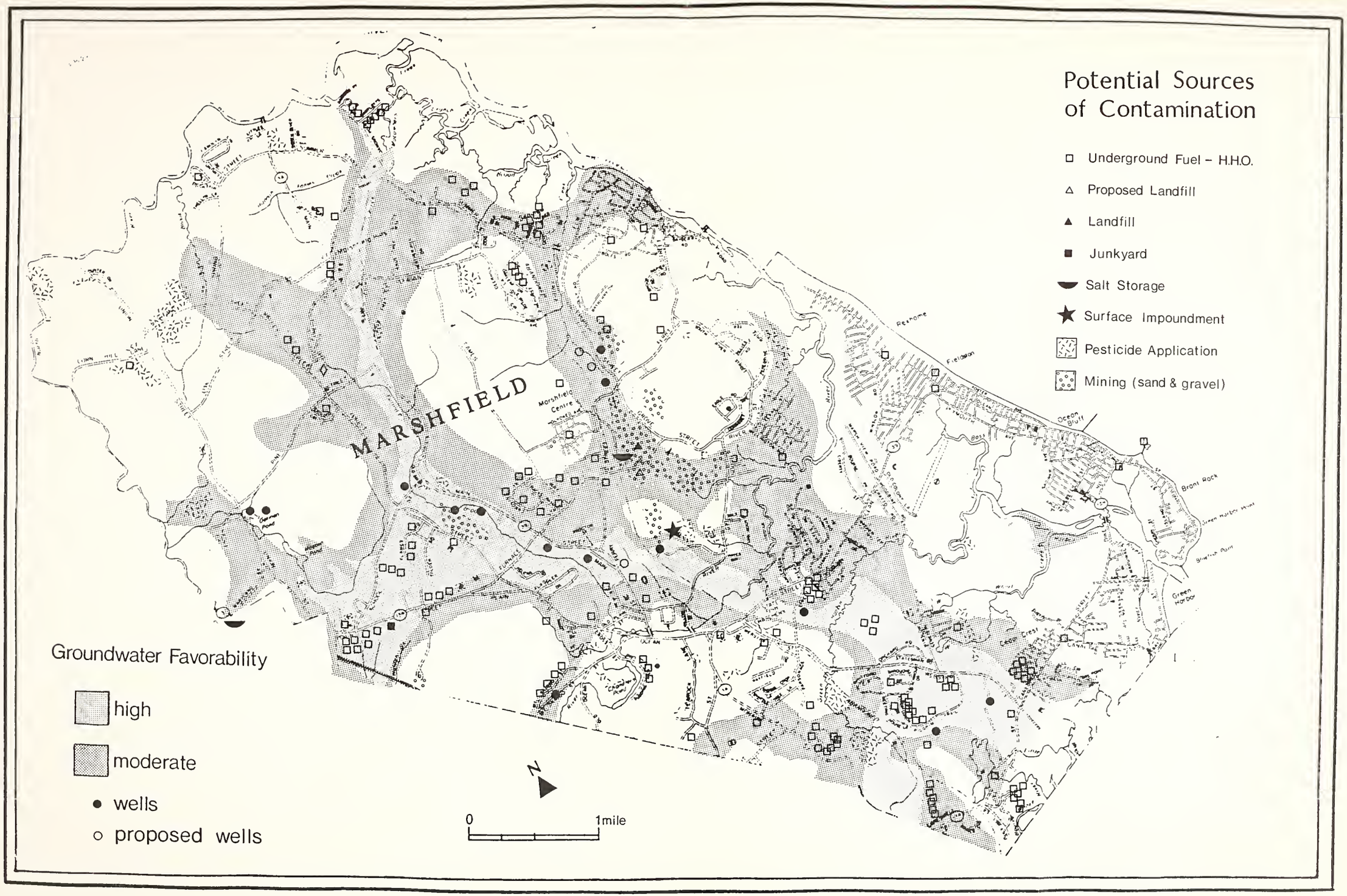
4 Zoning


WATER RESOURCES AND
ENVIRONMENTALLY SENSITIVE AREAS
MARSHFIELD
Marshfield Centre
Fieldston
Ocean Bluff
Brant Rock
Green Harbor
Groundwater Favorability
high
moderate
wells
watersheds

Marshfield

LAND USE




Potential Sources of Contamination
Underground Fuel – H.H.O.
Proposed Landfill
Landfill
Junkyard
Salt Storage
Surface Impoundment
Pesticide Application
Mining (sand & gravel)
MARSHFIELD
Marshfield Centre
Groundwater Favorability
high
moderate
wells
proposed wells
N
0
1mile

Marshfield

Zoning Map

SYMBOL	DISTRICT	REQUIRED MINIMUMS		
		LOT AREA (Sq. Ft.)	FRONT YARD (Ft.)	LOT WIDTH (Ft.)
R-1	RESIDENTIAL-RURAL	43,560	40	125
R-2	RESIDENTIAL-SUBURBAN	20,000	40	100
R-3	RESIDENTIAL WATERFRONT	10,000	15	80
O-P	OFFICE-PARK	20,000	40	125
B-1	BUSINESS-GENERAL	10,000	40	100
B-2	BUSINESS-HIGHWAY	20,000	40	150
B-3	BUSINESS NEIGHBORHOOD	5,000	20	80
B-4	BUSINESS-WATERFRONT	10,000	10	[illegible]
I-1	INDUSTRY	40,000	40	150
A	AIRPORT	20,000	40	125

COASTAL WETLANDS

INLAND WETLANDS

NOTE:
PL = Property Line
CL = Center Line
SLP = Straight Line Projection
SLC = Straight Line Connection

SCITUATE

NORWELL

NORWELL

R-1 R-2 R-3 B-1 B-2 B-3 B-4 O-P A I-1

Groundwater Favorability

high

moderate

• wells

N

0 1mile